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British Society for the History of Pharmacy

Q House,Troon Way Business Centre, Humberstone Lane, Thurmaston, Leicester, LE4 9HA
Tel: 0116 274 7355, Fax: 0116 274 7365, Email: bshp@associactionhq.org.uk
Website: www.bshp.org

The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

Aims

Promotion of historical studies related to pharmacy.
Advancement of knowledge and propagation of understanding of the history of pharmacy.
Publication of the research work of pharmaceutical historians.
Preservation of pharmaceutical artefacts and historic pharmacies.
Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

Pharmaceutical Historian

The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 or 20 pages and cover.
An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.
Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*
Any illustrations are converted to monochrome for printing. Further details of requirements can be found on the website *www.bshp.org* under Publications.

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Editor: Ainley Wade, BPharm, MPhil, FRPharmS, FSP
Q House, Troon Way Business Centre, Humberstone Lane, Thurmaston, LEICESTER LE4 9HA
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Diary

Please note that for 2012, evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting With refreshments at 5.00 pm, unless otherwise noted.

Monday 14 May 2012
'History of the Wellcome Foundation' by Dr Tilly Tansey. 6.00 pm at Lambeth.

Future dates
October 2012 to be confirmed.
November 2012 to be confirmed

BSHP Annual Spring Conference 2012

The annual conference 2012 will be held from Friday 30 March to Sunday 1 April at Abbots Barton Hotel, 36 New Dover Road, Canterbury CT1 3DU. A few places are still available. For further information, contact Dr S Ellis, 1 Willow Way, Bottisham, Cambridge. CB25 9BS or e-mail shirleyellis@shirlellis.plus.com

Facebook

BSHP now has a Facebook page. You can find it by searching for "British Society for the History of Pharmacy" once you have logged into Facebook.

Editor's note: From this issue, the inside and outside back cover pages will be included in the pagination.

International Society for the History of Pharmacy

Further updates to the ISHP website have been made and several new talks have been added to the database.
Click and explore on http://www.histpharm.org/database
News from ISHP can be found and is worth revisiting on a regular basis on http://www.histpharm.org/news.htm

Christiane Staiger
ISHP Internet Commissioner
info@histpharm.org

Book Review

The First Pharmacy in Luton, Established in 1825 and the History of Duberly and White.

White, David, 2011. Oyster Press, Whitstable. pp.90. ISBN: 978-1-899177-22-6. Price £9.99.

The cover of this A4 size paperback bears a black and white photograph of "The Market Hill Pharmacy, Established 1825" which, we learn from the introduction, was the first pharmacy to be opened in Luton. It was later to be named "Duberley and White" when a member of the author's family bought the business. Over the years the business expanded and, at its peak, had seven branches within Luton including a wholesaler plus an optician.

The author, David White, has painstakingly researched the history of the business, particularly his family's involvement. The book is lavishly illustrated with sixty-eight illustrations including photographs of old Luton and the family shops, the White family, documents, advertisements, shop

Continued on p. 7

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An Early Medicine Chest

Dr Helen Dingwall and Dr Peter M Worling
Edinburgh

One of the pharmaceutical/medical artefacts that we all recognise is the medicine chest, a forerunner of today's first aid cabinet and bathroom medicine cabinet. Medicine chests were generally available in the United Kingdom from the 18th century; as they were made by the carpenters who made mahogany writing slopes and mahogany boxes, they were often handsome pieces. The empty boxes were fitted out by pharmacists and wholesalers before being supplied to the public. They ranged from simple boxes to more elaborate folding cabinets and also large cabinets which were intended to be used by medical practitioners in their consulting rooms.

Briony Hudson reported on the contents of a Georgian medicine chest.[1] The article detailed the contents, and many of the items in that chest are still familiar to us. For example, there are preparations of Rhubarb, Jalap, Ipecacuanha, and Calomel, and the contents give us a very good picture of the medicines that were in common use at that time. The medicine chest that is described in this article was made in Italy and is from the 17th century, an earlier period than they were generally available in Great Britain. This gives us an insight into some of the medicines that were in use at this earlier time.

During research for a forthcoming illustrated book on medical artefacts, Dr Helen Dingwall was given the opportunity of examining an early medicine chest which is in the possession of the Clerks of Penicuik, a well known Scottish family. John Clerk was born in 1611 in Montrose, Angus, a town on the East coast of Scotland. He was the son of William Clerk a local merchant and in 1634 he moved to Paris to set up a business as a general merchant. He was very successful and. returned to Scotland in 1646 where he purchased the Barony of Penicuik, outside Edinburgh, including the manor house of 'Newbiggen'.

John died in 1674 and was succeeded by his son, also John, who was created a Baronet of Nova Scotia by letters patent on the 24th March 1679. Sir John Clerk, the second Baronet, went on a grand tour of Europe from 1697 to 1700. The box bears a label in its lid which states:

This medicine chest was presented to Sir John Clerk of Penicuik by Cosimo, Grand Duke of Florence in 1698.

Cosimo III was born in 1642. After his father's death he succeeded him as Grand Duke of Tuscany and reigned from 1670 to 1723, the longest reign in Tuscan history,

Medicine chest

The medicine chest is made of polished wood and measures 26.5cm wide, 14cm deep and 14.5cm high. It is fitted with a lock and metal strap hinges. The lid lifts up to reveal a top compartment divided into eight compartments, with space at one end for a decorated tin box (Figure 1). Each compartment has a leaflet extolling the virtues of the medicine.

In one corner of this top compartment there is a wooden peg which releases a drawer in the bottom of the

Figure 1. The medicine chest.

box, which slides out to the side. This drawer is divided into ten compartments; nine of these hold a glass bottle sealed with a cork and the top covered with parchment (Figure 2).

Each compartment also has a leaflet giving details of the contents. These leaflets are important because

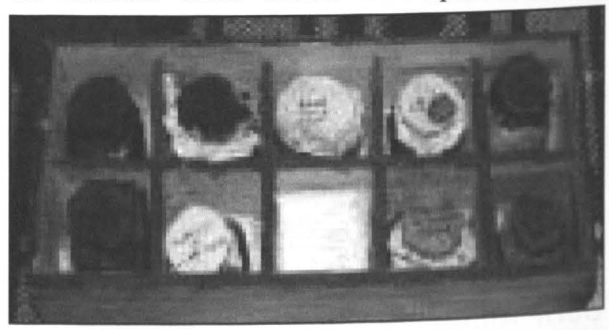

Figure 2. The drawer.

although each product has been labelled on the parchment cover, with the passage of time together with staining of the tops with the contents in some cases, not all of the labels are legible. The names are however on each leaflet together with a description of the use of the product.

Each printed leaflet has the arms of the Medici family at the top. The heading then gives the name of the product and in most cases this is followed by the words 'Di Fonderia di S.A.S.' In a number of cases the alternative wording 'Di Fonderia del Serenissimo Gran Duca' are used or 'Gran Duca di Toscana'. In the case of one product, Acqua Triacalle, the name is followed by the words 'della Fonderia del Serenissimo Ferdinando

Pharm Hist (Lond) 2012; 42 (1):
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Secondo Gran Duca di Toscana cioe' which would indicate that this particular formula is associated with Ferdinand II, the father of Cosimo III.

The following translation of the leaflet accompanying the product Giulebbe Perlato – Pearl Julep – gives the flavour of these leaflets (Figure 3).


GIVLEBBE PERLATO
Di Fonderia di S. A. S.

Figure 3. Giulebbe Perlato leaflet.

> This Julep has a very pleasant and mild taste and at the same time is very effective for refreshing and comforting all sorts of ill people and particularly those feverish, exhausted by a long, or malignant illness, because it comforts the heart and all the vital faculties; invigorating all the nature of patients. It resists decay and extinguishes feverish heat. The use of the Julep is 20, 30, or 40 drops on its own, or with broth, or cordial waters and also syrups and in accordance with the physician's advice. It acts more effectively than those other pearl Juleps which are manipulated differently.

Reading through these leaflets, it becomes clear that the laboratory considered these formulas as their own private formulas and in the case of Polvere contro Veleni, a secret remedy which was not available anywhere else. The patient is frequently warned not to accept substitutes, and to be careful to look out for counterfeit medicines.

The word 'fonderia' is used in the title of each medicine; this translates in English as 'foundry'. It is recorded that the Medici family were interested in research into chemistry and the manufacture of glass. In the early 17th century Grand Duke Antonio Medici established a laboratory in the Casino di San Marco which was known as the Foundry. This laboratory was maintained by succeeding Grand Dukes, and is evidence that the medicines in this chest originated from the laboratory of the Medici family.[2,3]

Contents

The following are the eighteen items which are contained in the chest and the tin containing tablets:

In the top compartment

1. Acqua da Petecchie

A distilled water for the treatment of a skin rash or impetigo. Petechie refers to a skin condition caused by haemorrhage just under the skin, but in this case the medicine probably would be used for more wide-spread skin conditions.

2. Elixir Proprietatis

This is a well known preparation which was also known as Elixir Paracelsi or Elixir Proprietatis Paracelsi. This preparation was in use for many years and held in high regard. A formula for making an elixir is given in the *Archidoxorum Avreoli Theoprasti Paracelsi* of 1570.[4] This contains Myrrh, Aloes, and Crocus (Saffron). The medicine's popularity is indicated by this extract of the chapter heading from a 1671 publication:[5]

> Known by all physicians to be the greatest cordial and only medicine in the world for long and sound life: restoring nature even at the point of death, and effectually taking away all the seeds of disease.

It was included in the *BPC* 1923 and 1934 as Tincture of Aloes and Myrrh. The formula is given as Aloes 2oz, Saffron 1oz, and Tincture of Myrrh 20 fl oz. Macerate for seven days with frequent agitation and then straining.

3. Ess. di Contraierva

This is Essence of Contrayerva, which is usually prepared as an aqueous or alcoholic extract of the aromatic root of *Dorstenia contrayerva* (Moraceae) a herb found in South America, Mexico and the West Indies. It is a dull reddish root and commercially available in pieces one to two inches in length. There are many species of *Dorstenia* and in commerce it may have been adulterated. It appears to have been quite well known at this time and must have been imported into Europe from the South Americas. Dr. Nathaniel Hodges[6] in his *Loimologia* of 1665, and other writers, recommend Contrayerva as an anti-epidemic, and as a gentle tonic, for the treatment of fevers and for snake bite. It was also recommended by some authors for measles, small pox, scarlatina, erysipelas and typhoid.

4. Olio da Stomaco

This is an oil for the treatment of stomach complaints. Because it is an Italian preparation it is possible that it is Olive Oil or a preparation of Olive Oil, which has a long history of medicinal use both externally and internally.

5. Acqua da Colica

A water to treat the Colic. This water is:

> of value against the pain of Colic, all accidents of the womb and wind, two dramme to be taken with a generous quantity of warm wine.

6. Poluer da Renella

This is read as 'polvere' a powder to treat 'sand' in the kidneys. This refers to the condition of kidney stones or concretions.

7. Giulebbo Gemmato[11]

This was a well known remedy and is a 'Julep' or syrup of precious stones. The use of precious stones, as a powder, for the treatment of disease was not uncommon

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at this time. It was a costly treatment so it would have been restricted to rich patients and the cost may have helped to increase the patient's belief in its effectiveness. There are a number of different formulas, and notes on the preparation are detailed in the *Teatro Farmaceutico* of 1681.[7] This prescription takes two drachms each of Topaz, Emerald, Robini, Sapphire, Giacinti,(Hyacinth) Sardonyx (Onyx), and Rose Coral and powders them in a porphyry mortar. The crushed stones are then digested in acid and further treated to prepare the final medicine.
Onyx was at one time recommended for increasing stamina, healing lungs and bones and had other properties. Coral was used as a source for calcium. Recently Bristol Myers Squibb have introduced a chemical Eleutherobin extracted from a species of coral which has the properties of binding protein material within cell structures, which is hoped can be used to stop the division of cancer cells. (See also Worling and Console, *Pharmaceutical Historian* 2012; 42: 5-7.)

8. Acqua Triocello

Water of Theriac. This is a form of Theriac or theriaca, a well known compound medicine which was originally of Greek origin. It was considered an antidote to snake bites and a universal cure-all.[8] Because of the many ingredients it took weeks to prepare. Also prepared as an electuary it was sometimes known as Venice treacle. Galen the Roman physician was reputed to produce a version with 64 ingredients.

9. Decorated tin box

This contains tablets which bear the crest of the Medici family on one surface and a reference to the Foundry on the other. They are a greyish white and look like tablets of prepared chalk (Figure 4).

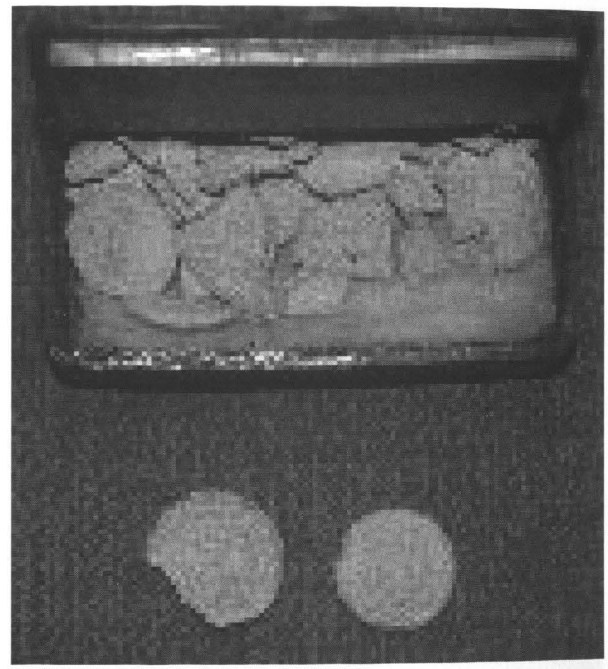

Figure 4.

Contents of the lower drawer

10. Olio o Balsomo li Bachi

This is an oil or balsam to treat an infection of worms. 'This balsam works effectively against all the problems caused by worms.'

11. Balsamo o Vero Olio per le Ferite

This translates as a genuine oil to treat wounds.

12. Olio contro Valeni

An oil to be used against poisons.

13. Elixirvite

An Elixir of life. There have been a number of different products and formulations supplied as an elixir to prolong life. The accompanying leaflet states

> This is an elixir which works admirably to restore those weak or prostrated with illness, because it solaces and gladdens the heart, enhances natural warmth and bans decay.

14. Polvere Contro Valeni

A powder to be used against poisons.

15. Terra Sigillata

Literally 'stamped earth'. This is a medicinal clay from the Island of Lemnos which was formed into tablets and stamped with a distinctive seal.[9] It was used both internally and externally against poisons and for dressing wounds. The container for this medicine is missing so we cannot determine whether this was a powder, or a stamped tablet.

16. Essenza di Contraierva

This appears to be the same preparation as item number 3.

17. Unguentum da Fuoco

An ointment for burns. The leaflet states that

> this ointment works marvellously against all burns and scalds.

Burnett[10] describes an Ung. da Fuoco de Capua which he translates as Capuan ointment. He believes that this indicates that fire was probably used in preparing the ointment. From the leaflet however this preparation is an ointment to treat burns.

18.Olio da Spasimo

An oil to cure spasms. The leaflet says that this oil

> is wonderful in curing and removing the spasm, or convulsions of the nerves, as well as for prevention.

19. Giulebbe Perlato

Pearl Julep. There are references in the literature to a number of prescriptions for a Pearl Julep which contained prepared pearl, together with other herbs. The leaflet accompanying the Julep is translated in this article (p. 3) as an example of these leaflets.

Conclusion

The contents of this medicine chest give us some indication of the medicines that were in use in Italy at the time of its construction. It is particularly interesting because it is dealing with the 17th century, a period when medicine chests were not generally available in the United Kingdom. The medicines supplied were intended to treat many common complaints such as indigestion, skin conditions, poisons, wounds and tonics. While it is possible to read all the names of the medicines in the chest, more research would be needed to clarify the contents of a number of these medicines. As the

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ingredients were treated as trade secrets by the manufacturing laboratory, it may be that the details of these formulae have been lost with time.

Acknowledgements

I should like to record my grateful thanks to Sir Robert Clerk for allowing us to examine the medicine chest in detail and to Renzo Console not only for the translations of the Italian text, but also for researching the development of the laboratory of the Cosimo family, known as the 'Foundry'.

A preliminary paper on this medicine chest was presented at the BSHP Spring Conference, York, March 2011.

Corresponding author: Peter M. Worling; email p.worling@virgin.net

Endnotes and References

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10. Burnett, J. The Justinian Medical Chest. *Medical History* 1982; 26: 325-333.
11. Worling PM and Console R. A Julep of Gems. *Pharm Hist (Lond)*; 2012 42 (1): 5-6 (below).

A Julep of Gems

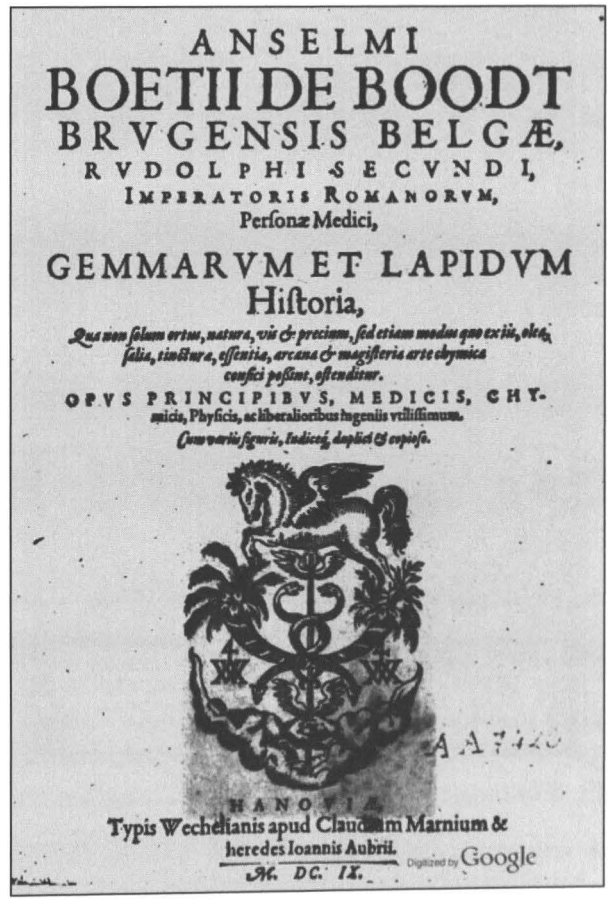
Dr Peter M Worling and Renzo Console

On examining the 17th century Italian medicine chest which was presented to John Clerk of Penicuik, Edinburgh in 1698 by Cosimo de' Medici, the Grand Duke of Florence,[1] two of the interesting medicines were labelled Giulebbo Perlato, a Julep of Pearls, and Giulebbo Gemmato, a Julep of Gems. There is a leaflet accompanying each of these medicines which is headed 'della Fonderia di SAS' from which we know that these medicines were supplied by and perhaps manufactured at the 'Foundry'. This was the laboratory of the de' Medici family, created originally by Antonio de' Medici and sited in their palace the Casino Mediceo di San Marco in Florence, a centre of chemical experimentation in the early 17th century.

The use of gems

The use of precious stones and pearls in medicine at this time was not unusual, although it is assumed that they were expensive preparations and their administration confined to the richer members of the population.

We do not know the ingredients of the two juleps from the Foundry; they considered their formula to be secret and probably the ingredients were only known to some of the workers in the laboratory. In the case of the Pearl Julep, the use of Pearls in medicine was of ancient origin with references from the 13th century.


ANSELMI
BOETII DE BOODT
BRVGENSIS BELGÆ,
RVDOLPHI SECVNDI,
IMPERATORIS ROMANORVM,
Perſonæ Medici,
GEMMARVM ET LAPIDVM
Hiſtoria,
OPVS PRINCIPIBVS, MEDICIS, CHYmicis, Phyſicis, ac liberalioribus ingeniis vtiliſſimum.
HANOVIÆ
Typis Wechelianis apud Claudium Marnium & heredes Ioannis Aubrii.
M. DC. IX.
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Title-page of de Boodt's *Gemmarum et Lapidum Historia*. Google Book Search, http://books.google.com/.

One method of preparation, which indicates how it could have been prepared, is described by Anselmus de Boodt, a mineralogist and physician who was born in Bruges in 1550.[2]

> Aqua Perlata can be prepared very conveniently [...] in this way. Dissolve the pearls [reduced to a fine powder] in very strong wine vinegar or more conveniently in lemon juice, or spirit of vitriol or of sulphur [...], having added fresh lemon juice immediately. Then add [...] sufficient sugar to achieve sweetness. If there are four ounces of this solution add one ounce each of rosewater, of tincture of strawberries, of flowers of borage and of balm; and two ounces of cinnamon water. When you want to administer it shake the water well. [...] Nothing more excellent can be had.

https://doi.org/10.24355/dbbs.084-201802211535

The leaflet accompanying the preparation in the medicine chest states:

> This julep has a very pleasant and mild taste and is very effective for refreshing and comforting all sorts of people; particularly those feverish or exhausted by a long or malignant illness, because it comforts the heart and all vital faculties.

Portrait of Anselmus de Boodt by A Sadeler.
Friends of Jade, http://www.friendsofjade.org

Preparation of a Julep of Gems

In the case of the Julep of Gems, this is a more complicated preparation. Mesue in his *Canones Universales*[3] mentions the use of Electuarium de Gemmis and the Italian physician Quirico degli Augusti in his *Lumen Apothecariorum* published in 1492[4] gives the formula for an Electuarium de Gemmis which includes sapphire, sardonyx and cinnamon among its thirty ingredients. There are known to be a number of different formulae which the Foundry could have used. However we have a contemporary source in Donzelli's *Teatro Farmaceutico* of 1681.[5] Part three of this work deals with the preparation of juleps in some detail and includes two recipes for a Julep of Gems. The instructions for preparing the first Julep reads:

> Take two drams each of Topaz, Emerald, Ruby, Sapphire, Hyacinth, Sardonyx [a form of red banded onyx] and Coral. […] Grind in [a] porphyry […] [mortar] with distilled vinegar until [the powder] is so fine that it cannot be felt as sand between the teeth; place in a glass vessel with a long neck and […] cover with two inches of distilled vinegar. Cork the […] vessel carefully and place in a Bain-Marie to extract the tincture in accordance with the art [secundum artem]; place the filtered […] solution […] into a glass vessel and evaporate the liquid in a Bain-Marie, leaving all the extract of gems in the bottom. Add sufficient orange flower water to remove the saltiness and make the extract sweet.
>
> […] Take three drams of Oriental Musk, two drams of select grey Amber, Water of life distilled from excellent Wine, and rectify three ounces. Make a tincture, or an extract, in a Bain-Marie […] [and set aside]. […] Take two ounces of Alkermes Electuary, one and a half ounces of Electuary of Gems, one ounce of Confection of Hyacinth, two and a half pounds of Water of Orange flowers, mix and digest […], then distil in a Bain-Marie until the dross is dry. Add three pounds of white sugar candy to this distilled water and heat it until it is the consistency of […] syrup, […] remove from the heat and add the […] extracts of Gems and of the Musk and Amber; make a Julep […]. This [preparation] is used for fevers of a malignant quality, especially when it is necessary to strengthen the heart, for faintness and heart disease. The dose is one spoonful.

There is a note with this prescription which adds:

> Pietro a Castro describes […] [this] recipe which he says is from the Most Serene Grand Duke of Tuscany, and therefore cannot be criticised. However I […] remain doubtful about the method of extracting the tincture from the Gems, without calcinations. I know […] that Coral can be dissolved without calcinations, but the other Gems […]

Title-page of Donzelli's *Teatro Farmaceutico* 1681.
Google Book Search, http://books.google.com

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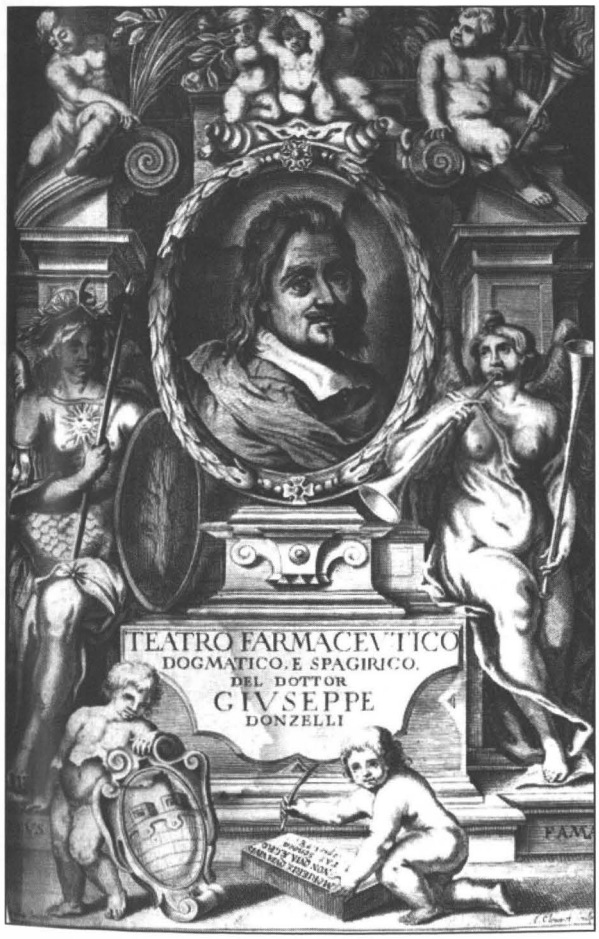
are very hard [and] cannot be dissolved. For this reason Quercetanus [the French physician Joseph du Chesne, active in the late 16th and early 17th centuries] when preparing [...] uses flower of sulphur to calcine them and I have tried this way with excellent success.

This note gives us the evidence that this was one of the formulae which was used in the 'Foundry'. Castro queries the method of preparation and it is interesting to note that an Electuary of Gems is added to the third solution before making the final preparation.



Decorated frontispiece of Donzelli's *Teatro Farmaceutico* with the author's portrait.

Google Book Search, http://books.google.com

A second recipe

There are other methods of preparing a Julep of Gems. Donzelli gives a second recipe which seems to be a simpler preparation.

Take one dram each of prepared Pearls and red Coral, two drams each of prepared Hartshorn and Bezoar stone and one half dram of [...] fragments of precious stones.

Mix, reduce to a powder in a porphyry mortar, sprinkle with one dram of oil of Sulphur and leave for 24 hours until the powder gives an inflorescence, then powder again and add one pound of Citrus Flower Water in a glass vessel. [Then add] three pounds of water of all the parts of [the] Citrus [plant]; half a pound each of water of Orange flowers and of Spanish salsify.

If instead of the latter two waters you will add water of blood and heart of Deer, together with its salt, it will be [much] better, and exquisite. [This is a large volume of diluents.]

'Boil in a Bain-marie for about three hours, digest for 24 hours, strain [...] and add [...] fine white sugar [...] to the filtered liquid [and] heat [...] until it is of the consistency of a Julep. Finally flavour with a scruple of Grey Amber. The dose is one spoonful.

Conclusion

From the number of references to the preparation of juleps, we can assume that this was a popular method of giving medicines in the 17th century. Many of these used herbs and were simple to prepare: we have examples of juleps containing fennel, pepper, jasmine, aniseed and carnation. In the case of Juleps of Gems however because of the nature of the ingredients these were more difficult to prepare.

Juleps of Pearls and those containing coral could be digested with acid after grinding to a powder. The precious stones that were used such as topaz, emerald and sapphire would have presented greater problems. Donzelli comments on the need to heat these in fine powder with Oil of Sulphur to enable them to be dissolved; otherwise he did not believe that they would be dissolved properly. Despite the high cost of making these preparations it is difficult to believe that they were therapeutically very active, other than the antacid effect of the pearls and the coral.

Authors' addresses:
Peter M. Worling, *p.worling@virgin.net*
Renzo Console, *mail@renzoconsole.demon.co.uk*

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Review: *continued from p.1*

labels and pages from prescription books. In the appendices there are analyses of a number of the prescription books and of the owners' recipe books.

Famous people mentioned as customers include the owners of Luton Hoo from the Marquis of Bute to Sir Harold and Lady Zia Wernher. A testimonial from a newspaper states that the famous actress, Ellen Terry, lauded the benefits of Duberley's dentifrice.

The book will certainly interest anyone interested in the local history of Luton. Pharmacists will gain much pleasure from reading the prescriptions and the chemists' labels.

Copies are available for £9.99 plus £1.00 p+p from the author, telephone: 01304 842345 or email: david.white@armingford.co.uk **Peter G Homan**

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Two green cosmetics of ancient Egypt?

Andrew Hardy* and Gavyn Rollinson**

*Centre for Medical History, College of Humanities, University of Exeter, Devon, UK

**Camborne School of Mines, University of Exeter in Cornwall, Tremough Campus, Penryn, Cornwall, UK

The labels said 'malachite' for the two samples, both being from the museum's ancient Egypt collection. Malachite is a green mineral [basic copper carbonate, $CuCO_3.Cu(OH)_2$] that was readily available in the eastern desert and Sinai of ancient Egypt.[1] One sample (Museum Accession No. 6612B) comprised several small green lumps with a freshwater shell (*Corbicula fluminalis*, see Figure 1), from Sidmant and dated to the 1st Dynasty (c. 3100–2890 BC).[2] The other sample (Museum Accession No. 5100) consisted of several loose green lumps, from Qurna but of unknown date. Both of the samples were assumed, by the museum, to be green (eye) cosmetic pigments; which usually have been found to have malachite as the major component when analysed.[3,4]

It is said that 'cosmetics are as old as vanity' – but how old is vanity? Vanity in the afterlife, inferred from the cosmetics left as grave goods, existed in the pre-dynastic (5500–c. 3100 BC) era of ancient Egypt. In this period the colour of such grave goods was usually green and the material often found as loose lumps, sometimes in an open shell. To date, only seven green cosmetic samples from ancient Egypt have been chemically characterised. Six were done over fifty years ago by 'wet chemistry' analytical techniques. Five were found to be malachite and one was the blue-green mineral chrysocolla (a copper silicate, one formula of which is $CuSiO_3.2H2O$).[3] These six samples ranged in date from pre-dynastic to the 19th dynasty (1295–1186 BC) and were all found in Upper Egypt (i.e. south of Memphis). One more sample was analysied by us recently, using modern spectroscopic analytical techniques, and its major component was also found to be malachite.[4] This sample was dated to the 18th dynasty (1550–1295 BC) and was found at Tell el-Yehudiyeh in the Nile Delta (i.e. Lower Egypt).

These green 'eye paints' were also used in some of the ancient Egyptian medical recipes, most often in their eye medicines.[5] Additionally, they had ritual/temple offering uses, often associated with the Eye of Horus.[6]

Results and discussion

The two green samples mentioned here were part of a larger project that was looking into the chemical composition of some of the ancient Egyptian eye cosmetics (kohls) in the Egyptian collection at Manchester Museum, University of Manchester (UK).[7,8] The analytical techniques used in the chemical analysis of the samples were Low Vacuum Scanning Electron Microscopy (LVSEM), X-Ray Powder Diffraction (XRPD) and Quantitative Evaluation of Minerals using Scanning Electron Microscopy (QEMSCAN). The first technique gives a quantitative summary of the elements present (down to and including an atomic number of 6, i.e. carbon); the second gives a semi-quantitative summary of the crystalline compounds present and the last technique gives a quantitative summary of the inorganic/mineral compounds present – regardless of whether they are crystalline or amorphous.[4]

The museum's accession number is used to identify each sample when its analytical results are given below. Also given is the site where each sample was found (see Figure 2) and its assigned date. The analytical results for each sample are given in the following way: first the LVSEM results (in decreasing order of elemental weight percent, with the elements in brackets being at less than 1% each), then the combined results of QEMSCAN and XRPD. The former technique, whilst it does give quantitative weight percents, does sometimes only identify a *group* of inorganic compounds. The latter technique can identify the *actual* inorganic compound present from this group, provided it is crystalline and present at a percentage above the equipment's relevant resolution limit. Thus we have listed, for each sample, the QEMSCAN results with their percentages and with the XRPD results, if available, given in brackets (in decreasing order of their approx. percentages if consisting of several compounds) after any group listed. The detection limit for our XRPD equipment is taken to be 2% for these samples, and so all inorganic compounds found (by QEMSCAN) at below this value are only qualitatively summarised at the end.

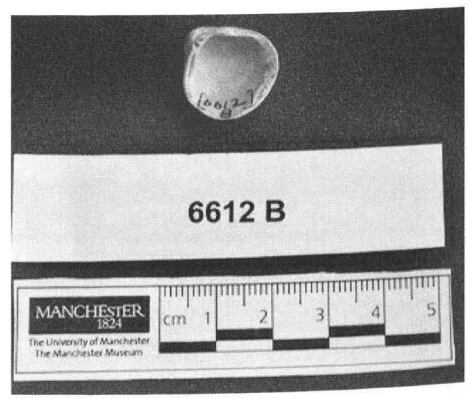

Figure 1. Container (shell), accession number 6612B (1st Dynasty)
(© The Manchester Museum, University of Manchester, UK)

Sample 6612B (Figure 1, container shell only).
It was found at Sidmant and was dated to the 1st dynasty. When one of the green lumps was crushed a pale green powder was obtained.

LVSEM: O, Cu, C, Ca, Si, Cl, Mg, Al, Fe (S).

QEMSCAN (XRPD): Copper chloride 62.9% (paratacamite, a basic copper hydroxy-chloride, $CuCl(OH).Cu(OH)_2$); copper silicate 20.2% (assumed to be amorphous chrysocolla); quartz (SiO_2) 13.0%; with

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the remainder consisting of copper oxide/carbonate (malachite), iron oxide/carbonate, calcite ($CaCO_3$) and a calcium silicate.

Sample 5100. It was found at Qurna, and was of unknown date. When one of the green lumps was crushed a blue-green powder was obtained.

LVSEM: O, Si, C, Cu, Ca, Fe, Al (Sn, Na, S, Pb, Mg, P, K, Cl).

QEMSCAN (XRPD): copper-calcium-silicate 73.5% (cuprorivaite, $CuCaSi_4O_{10}$); quartz 10.9% (two forms of quartz were identified; the usual room temperature form and a smaller amount of one of the high temperature forms, tridymite); lead compound(s) 8.3% (galena, lead sulphide, PbS; and anglesite, lead sulphate, $PbSO_4$); copper silicate 2.0% (assumed to be chrysocolla); with the remainder consisting of calcium silicate, cassiterite (a tin oxide, SnO_2), biotite ($H_4K_2Mg_6Al_2Si_6O_{24}$), plagioclase-feldspar(s) (variable formulae silicates), iron-aluminium-magnesium-silicate(s), calcium sulphate(s) and a sodium-calcium-silicate (possibly devitrite, $Na_2Ca_3Si_6O_{16}$).

Originally, sample 6612B most likely consisted of a naturally occurring surface deposit of malachite, chrysocolla and quartz. It would probably have been in the eastern desert and close to the Red sea coast. Close enough for small amounts of sea-water and/or salt spray, over an extended period of time, to periodically come into contact with the deposit. Slowly the malachite would have been converted into paratacamite.[9] When almost all the malachite had been changed the deposit was found by man and some removed for 'green eye paint' (*wadju*).

By comparison, sample 5100 was man-made. When a mixture, in the correct proportions, of limestone (calcium carbonate), quartz, a copper-containing substance (assumed to have been, at least when first made by man, malachite) and a small amount of natron (mostly sodium carbonate and bicarbonate, Na_2CO_3 and $NaHCO_3$) flux is fired at between 850 and 1000 °C it produces Egyptian Blue, sometimes called blue frit.[10] To distinguish it from the rare mineral cuprorivaite there would also be present in the Egyptian Blue excess unreacted quartz and small amounts of: at least one of the high temperature forms of quartz (tridymite and cristobalite), calcium and copper silicates and also a (very) small amount of a sodium-calcium-silicate. This synthetic product was used as a blue *paint* pigment, and sometimes moulded into small objects, from at least the fourth dynasty (2613–2494 BC). When bronze was first *made* in Egypt (rather than being imported, as it was before the New Kingdom), from at least the reign of Thutmose III (NK, 1479–1425 BC), then the copper-containing substance used was often bronze scrap/scale/filings, in partial replacement at least of the original malachite ore. The Egyptian Blue so made would have contained a small amount of tin, as cassiterite. About 300 years later, from the end of the 19th

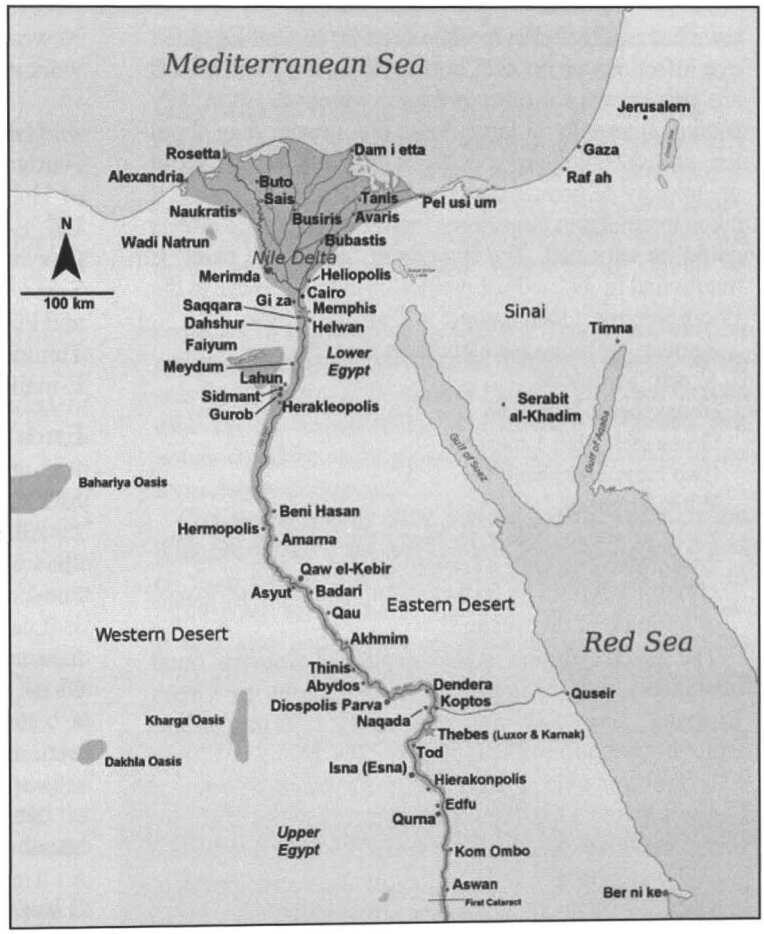

Figure 2. Map of ancient Egypt
(After: Jeff Dahl, Wikimedia Commons)

dynasty (i.e. 1186 BC), *leaded* bronze scrap etc started to be used in the production of Egyptian Blue; which would then have contained small amounts of tin *and* lead compounds. This practice continued until at least the time of Tiberius (d. 37 AD).[11] As our sample *does* contain the minor components mentioned above then it *is* Egyptian Blue, and also as it contains small amounts of tin and lead compounds then its date of manufacture must be sometime after the end of the 19th dynasty. However our sample was a *green* lump and gave a *blue-green* powder on crushing. Egyptian Blue powder is just that – a shade of blue. The green colour in our sample probably comes from a small amount of a surface degradation compound, such as copper-wollastonite ($(Ca,Cu)SiO_3$). Old tomb paintings (of Old and Middle Kingdom dates), which were originally painted using Egyptian Blue, are now found to have a green surface layer.[12] Time and environment have produced a whole range of surface (copper) degradation compounds, all of which are *green*. However, *when* did this colour change occur for our sample? Before or after it was used as grave goods? Our sample was found at Qurna as a green lump, and then designated as 'malachite' and a funerary cosmetic item. Was the *original* lump, when green, also designated as 'green eye paint'? We don't know, but it *could* have been.

It is *now* known that some copper compounds, such as malachite, do have antibacterial properties and so would

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have had positive effects when used on ancient Egyptian eye infections or on skin burns. However, toxic effects are also known for other copper compounds, especially if taken internally in large doses (i.e. greater than about ten grams).[13] Nothing specific is currently known about the toxicity of paratacamite or Egyptian Blue; though if taken internally in large doses then corrosive/toxic effects could be expected. The ingredient 'green eye paint' is mentioned in 39 medical recipes of the 877 found in the Ebers papyrus. One example is Ebers recipe No. 339:

> Another for removing cloudiness from the eye.
> Myrrh: 1 measure
> (four other ingredients)
> Green eye paint: 1 measure
> (two more ingredients)
> White/bright oil
> Place in water. Allow to spend the night in the dew. Strain. Bandage with it for four days.
> OTHERWISE SAID: Then you should pour it by means of a feather of the vulture.[14]

The 'green eye paint' is also mentioned in several ritual utterances; one example is in a 'Hymn to Green Eyepaint', one of several fragmentary columns of text from the pyramid of Pepi I (2321–2287 BC):

> I placed you in his eyes so that he may see the gods
> green eyepaint for Duau. To be said two times

where Duau is the patron deity of eye doctors, and where the eyepaint was being offered to the deceased king, probably representing the divine all-seeing eye (of Horus).[6]

Conclusions

As part of an ongoing research project looking into the chemical composition of ancient Egyptian eye cosmetics from Manchester museum we have found unexpected results for the two green samples studied. We have shown that whilst one sample was almost certainly largely malachite originally, it is most certainly *not* now mostly malachite. The most likely scenario for how this sample formed was that chloride-corrosion occurred, on a naturally occurring mixture of malachite plus quartz plus chrysocolla. The result was that over time most of the malachite was converted to paratacamite. The other sample, man-made Egyptian Blue, was probably made using at least some malachite, but our results show that scrap leaded bronze was also used. Using our knowledge of the minor components found in this sample we are now able to say that this sample is no older than the end of the 19th dynasty (1186 BC) and probably much younger.

Thus we can say that these two samples, which are well separated in both time and location of ancient Egypt, are *not* 'malachite' and that the museum's labels should be changed. One (6612B) *was* intended to be used as an eye cosmetic and one (5100) *could* have been.

Acknowledgements

We would like to thank Dr. Karen Exell, the curator of the Egyptian collection at Manchester Museum, for all her invaluable help with this project; and also to the staff of the Chemical and Materials Analysis Unit (University of Newcastle, UK) for most of the experimental LVSEM work mentioned in this article.

Authors' addresses: Corresponding author: Andrew Hardy BSc, DPhil, Centre for Medical History, College of Humanities, University of Exeter, Exeter EX4 4RJ, UK. E-mail: A.D.Hardy@exeter.ac.uk;
Gavyn Rollinson BSc, MSc MSCM, PhD, Camborne School of Mines, College of Engineering, Mathematics and Physical Sciences, University of Exeter in Cornwall, Tremough Campus, Penryn TR10 9EZ, Cornwall, UK. E-mail: G.K.Rollinson@exeter.ac.uk

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Oxymel in Medieval Persia

Arman Zargaran[1], Mohammad M Zarshenas[2], Alireza Mehdizadeh[1]and Abdolali Mohagheghzadeh[2]

[1]Research Office for the History of Persian Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

[2]Department of Traditional Pharmacy, Faculty of Pharmacy and Pharmaceutical Sciences Research Centre, Shiraz University of Medical Sciences, Shiraz, Iran

Oxymel, a medicinal drink or syrup compounded of vinegar and honey, is a formulation used alone or as a basis for medicinal dosage forms from ancient times to the current era.[1] Simple oxymel was used for its own therapeutic effects, as a modifier of other medicines' unwanted effects and as an adjuvant to reinforce the effects of other medicines in medieval Persia. About 1200 types of oxymel were also described and their considerations and contraindications were presented in Medieval Persian pharmaceutical manuscripts. In this article six common oxymel formulas are explained in detail. Medieval Persian practitioners also noted that oxymel originated from ancient Persia. The continuity of this formulation is shown between ancient times and the current era and its development as a traditional dosage form during history.

Oxymel had a long history and was widely used in ancient times. Oxymel was used by Hippocrates (460-370 BC) and Dioscorides (1st century AD) in epilepsy as the basis of medicinal formulations[2,3] or solely in fever,[4] by Galen (2nd century AD) to ease obstructions in the stomach,[5] by Soranus (1st-2nd century AD) as the basis of an oral contraceptive formulation containing rocket seed and cows parsnip,[6] and by Paulus Aegineta (7th century AD) as squill oxymel as a detergent medicine for asthma.[7] Oxymel was used as the basis in a formulation to treat tuberculosis in the early 20th century: '*A mixture of ten minims vinum antimoniale and one drachm oxymel scillae in water is given thrice daily*'.[8] This medicinal drink is also used in current medicine. A famous pharmaceutical oxymel, squill oxymel, is still included in current pharmacopeias and pharmaceutical textbooks such as *Martindale* and the *British Pharmacopeia*.[9,10] It contains the equivalent of 5% w/v of squill in acetic acid, honey, and water, with a dose of 2 to 4 ml.[9]

Oxymels were used widely in medieval Persia. In the early Islamic era Persians gathered medical knowledge from ancient civilisations such as ancient Persia, Greece and Rome and developed it highly during medieval times.[11] During this time, medical concepts were expanded and some medical manuscripts of this period, especially Avicenna's *Canon* of medicine, became the main medical textbooks in universities until the 16th (in west) and 19th (in east) century AD.[12] In this article, various types of oxymel, their production and applications, are discussed based on medieval Persian medical manuscripts such as *al-Ghanoun-fi-Teb* (Canon of Avicenna),[13] *Gharabadin-e-Salehi*[14] (Figure 1) and *Tohfat ol Moeminin*.[15]

Oxymel in medieval Persian medicine

Oxymel was a kind of syrup which is called traditionally *Sekanjabin* in Persia.[13] It is also used as an ordinary drink nowadays in Iran. Oxymel[16] contains vinegar and honey and is prepared by mixing vinegar (one unit), honey (two units) and water (four units). This mixture should be boiled until one-fourth of it remains and then the froth is removed. It is attributed to Galen.[13] Traditional Persian practitioners looked to Avicenna and noted that this syrup was firstly prepared by ancient Persians and then Greeks took up the formulation.[14,15] Avicenna suggested that honey could be replaced by sugar or sugar-candy in the formulation of oxymel.[13]

Oxymel was used both simply and in combination with other medicinal ingredients. Simple oxymel could be used for its own therapeutic effects or in order to modify and reduce unwanted effects of other medicines. It was also used as an adjuvant along with the main

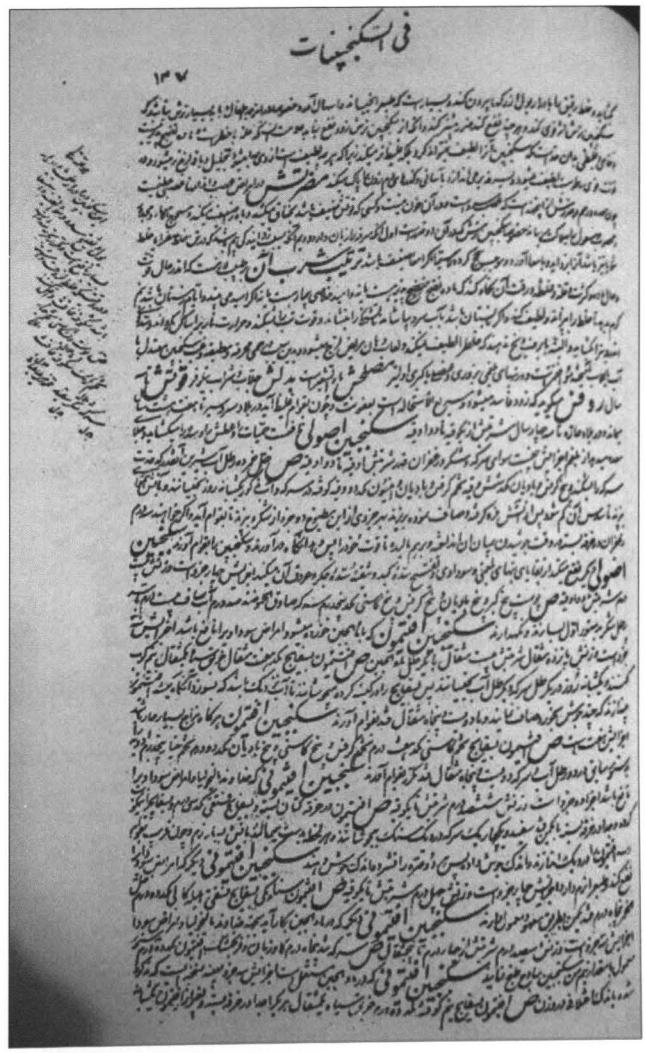

Figure 1. From a copy of lithograph edition of *Gharabadin Salehi.* Start of the chapter of *Sekanjabinat* (oxymels) (page 147).

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Table 1. Simple oxymel uses in medieval Persia.

Simple oxymel usage objectives	Examples
Therapeutic effects	Laxative, expectorant, diuretic effects and beneficial in obstructions[14]
Modifier or reducer of unwanted effects	Reduction of unwanted effects of mango, asafoetida and anise[13]
Reinforcing effects	With common nettle in flank pain; with blond psyllium for laxative effect; and with precious coral in splenomegaly[13]

Table 2. Traditional, scientific and common names of medicinal herbs

Common name[13,14]	Traditional name[13,14]	Scientific name[17]
Mango	*Anbaj*	*Mangifera indica* L.
Asafoetida	*Anjedan*	*Ferula assafoetida* L.
Anise	*Anisun*	*Pimpinella anisum* L.
Common nettle	*Anjereh*	*Urtica dioica* L.
Blond psyllium	*Esfarzeh*	*Plantago ovate* Forssk.
Precious coral	*Bossad*	*Corallium rubrum*
Fennel	*Razianaj*	*Foeniculum vulgare* Mill.
Celery	*Haza'a*	*Apium graveolens* L.
Cucumber	*Ghasad*	*Cucumis sativus* L.
Scammony	*Saghmoonia*	*Convolvulus scammonia* L.
Squill	*Onsol*	*Drimia maritime* (L.) Stearn
Ginger	*Zanjebil*	*Zingiber officinale* Roscoe
Wild carrot	*Jazar*	*Daucus carota* L.
Ajwain	*Nankhah*	*Trachyspermum copticum* (L.) Link
Cumin	*Koroya*	*Cuminum cyminum* L.
Pellitory	*Aghergharha*	*Anacyclus pyrethrum* (L.) Link
Mint	*Na'na*	*Mentha* × *piperita* L.
Pennyroyal	*Foodanaj*	*Mentha pulegium* L.
Lovage	*Kashem*	*Levisticum officinale* W.D.J.Koch
Caraway	*Komoon*	*Carum carvi* L.
Common rue	*Sodab*	*Ruta graveolens* L.
Herb hyssop	*Zoofaye yabes*	*Hyssopus officinalis* L.
Cassia	*Sana*	*Senna alexandrina* Mill.
Borage	*Lesan ol sowr*	*Borago officinalis* L.
Pomegranate	*Romman*	*Punica granatum* L.
Barley	*Shaeir*	*Hordeum vulgare* L.

medicine to fortify and reinforce the pharmacological properties (Table 1).[13,14]

According to traditional Persian medicine, oxymel had over 1200 different formulations containing various medicinal herbs in combination with simple oxymel ingredients.[15] These compound formulations were used in many therapeutic approaches. Some of the most common are explained below.[4]

Afsumali (an ancient oxymel). It was used orally in sciatica, arthralgia, epilepsy and as an antidote for snake-bite. Similarly, it is beneficial in complications of opium and potentially fatal poisons.

Vinegar (2.25kg), salt (976g), honey (4.9kg) and water (3.5kg) are mixed and reduced on a mild fire. It is removed from fire after boiling ten times.[13]

Sikanjabin al-buzuri. It was used to relieve fever and can be effective in gastritis. It has diuretic effect and also is beneficial in hepatic obstructions.

Wine-vinegar (4.5 kg) and water (9kg) were mixed together and then combined with root peels of fennel (90g) and celery (90g), fennel seeds (90g), anise (90g) and celery (90g). After a day the mixture is reduced on a mild fire until one-sixth of it remains. Then sugar-candy with half of the total weight is added to the mixture and boiled on a mild fire until half of the syrup remains.[13]

Mos'hel al safra **oxymel (oxymel for purging out yellow bile).** It is prepared from some clarified honey or sugar and old vinegar. The mixture should be cooked on a mild fire. Thereafter powdered extract of cucumber and scammony (30g of each) should be put in a piece of cloth and suspended over the mixture until the content of the cloth is dissolved in the mixture. When the mixture has thickened it should be removed from fire.[13]

Purgative squill oxymel. It is useful in flank pain, reflux, gastric pain, malabsorption and dysuria. To prepare, coarsely pound peeled squill bulb (900g), ginger (30g), celery seeds (60g), wild carrot (15g), fennel (30g), anise (30g), ajwain (15g) and cumin (30g), asafoetida root (30g), pellitory (30g), mint (30g), pennyroyal (30g), lovage (15g), caraway (7g), common rue (210g), flowers of hyssop (30g) and cassia leaves (15g) and soak in a mixture of 9.72kg of squill vinegar, 3.24kg of clarified honey and 1.62g of ripe grape juice. It should be filtered and kept in a clean glass vessel for one week.[13]

Simple squill oxymel: It is beneficial for asthma, cough and respiratory complications. This formulation contains squill vinegar and honey. It was administered with borage distillate or warm water.[14]

Pomegranate oxymel: It was administered in chronic fevers and has useful effects on liver and stomach function. Sweet and sour pomegranate juices (200g of each) are mixed with vinegar (100g) and then sugar (200g) dissolved in the mixture and boiled.[14]

Traditional and scientific names of medicinal herbs which are used in this article are shown in Table 2.

Traditional knowledge on oxymel

Besides various therapeutic effects and high consumption of the formulation in traditional medicine, practitioners and traditional pharmacists in medieval Persia noted some properties of oxymel. Actually the

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amount of vinegar in formulas can change the potency of preparations. If the total amount of this ingredient is more than the usual amount, it may be more effective. On the other hand excessive amounts of vinegar definitely increase unwanted effects. Most cited undesirable effects are additive complications in nervous disorders, libido reduction and gastrointestinal discomfort especially in GI weakness conditions. According to Persian medical manuscripts the shelf life of the formulation is up to three years. Although oxymel can be a good modifier for other medicines, it is recommended that giving the oxymel with aqueous barley extract may give better responses in some conditions and reduce the possible side effects.[14]

Conclusions

Pharmaceutical formulation has a long historical background.[18] The ancient oxymel is still used in current medicine. By reviewing medieval Persian pharma-ceutical and medical text books we can conclude that the first formulation of oxymel originated from ancient Persian pharmaceutical knowledge. The variety of its formulations and different clinical applications from the medieval era in Persia indicate the continuity of its usage. It is a part of the history of pharmacy and shows how pharmaceutical dosage forms developed in the medieval era.

Authors' addresses: Arman Zargaran (PharmD, PhD candidate of Traditional Pharmacy): zargarana@sums.ac.ir (postal address: Research office for the history of Persian medicine, Namazi health centre, north Ghaani avenue, Shiraz, Iran; postal code: 71397 48479; tel/ fax: +98 711 2304279)

Mohammad M. Zarshenas (PharmD, PhD candidate of Traditional Pharmacy): zarm@sums.ac.ir;

Alireza Mehdizadeh (MD, PhD – Assistant professor): alireza.mehdizadeh@gmail.com;

Abdolali Mohagheghzadeh (PharmD, PhD, PostDoc–Professor): mohaghegh@sums.ac.ir

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Getting medical information to the people: the role of Nicholas Culpeper 1616–1654

Dr Barry Strickland-Hodge FRPharmS

Senior Pharmacy Lecturer and Head of Medicines Management Academic Unit, School of Healthcare, University of Leeds

> Our aim is to give people access to comprehensive trustworthy and easy to understand information from a range of sources on conditions, treatments, lifestyle choices and how to look after their own and their family's health.
>
> Government White paper, *Equity and Excellence: Liberating the NHS*, 2010.[1]

Over 350 years ago, Nicholas Culpeper had the same aim.

Nicholas Culpeper was trained as an apothecary, though he never qualified. His understanding of both herbs and people made his a major contribution to healthcare. His desire, formed from his political views, was that everything should be made available to everyone in a form they could understand and at a price they could afford. His translation of the London College of Physicians' *Pharmacopeia Londinensis* or *Dispensatory* did not endear him to the physicians of the day but allowed others to treat themselves using the knowledge that was current. The *Complete Herbal* is still published and read today 350 years after his death at the age of 38. Getting medical information to patients in a format they can understand is till a UK Government aim. Nicholas Culpeper was born on October 18th 1616. He was educated at first to be an Anglican priest but was 'encouraged' to leave Cambridge before he could sit any exams. His early years however gave him a grounding in Latin which would serve him very well in the future as a translator and provider of medical texts in the vernacular of the day. He was appr-enticed to an apothecary and again, although he failed to gain his freedom following the full apprenticeship, possibly because of lack of funds, he practised a form of medicine while translating and writing Galenical

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books, some of which are still available today. *Culpeper's Complete Herbal,*[2] first published in 1653, contains information about 331 different herbs grown in England and commonly available to anyone in the 17th century. The monograph contains information about each plant: its appearance, its growing period and place, and the indications for its medicinal use. At the end of the book, after the description of yarrow, there is in many of the editions a full guide as to how to make the plants into useable 'simples' (i.e. one ingredient) and compounds for internal use and the methods of manufacture of ointments and other external forms. The herbal is written in the English vernacular and is based largely on experience of his and others' translations from Latin of Galenical writers. Some terminology is odd to the modern reader but would have been clear to any literate person of the day.

The 331 herbs included in the Herbal provide remedies for over 140 conditions, from agues (malaria) through freckles and other skin blemishes to plague, the biting of venomous beasts and most frequently for breaking down stones in kidneys, liver and bladder. The most common 'virtue' of the herbs was to provoke urine or in some other way to increase the flow of fluids, phlegm and the humours from the body in order to regain equilibrium, as Galen had taught. Death in childhood was common and some remedies for children were included, such as worms.

It should not be concluded that Nicolas Culpeper was the first to translate from the physicians' preferred academic language of Latin but he was one of the first to offer guidance on the production of medicines using common, readily available herbs and to sell his written works cheaply. Over 16 years Culpeper made an unauthorised translation of the London College of Physicians' *Pharmacopeia Londinensis* or *Dispensatory*[3] and produced his *Complete Herbal*[2] and a *Directory of Midwives*.[4] After his early death there were many other publications which used his name almost as a brand leader, some using information from his case books but more likely having nothing to do with the original author. To offer the people access to medical texts in a form they could understand and could afford was a major aim of Culpeper. Although not recorded as a Leveller,* it was certainly his political belief that all should be equal under God, that there should be religious and political freedom with votes for all and access to information in a language understood by the majority.

The Four Principles

Roy Porter, Senior Lecturer in the Social History of Medicine at the Wellcome Institute for the History of Medicine, suggested that there were four principles necessary for people to obtain medical information [5]

First there needs to be a body of accepted medical information that can be accessed. *Second* there need to be individuals who are able and willing (not necessarily the same thing) to translate, understand and put into simple English the existing medical information from often Latin texts. *Thirdly* there needs to be an easily accessible format such as pamphlet, leaflet or book available for mass production and mass accessibility. *Fourthly* there needs to be a literate populace which, as will be shown, in the mid 17th century was not universal by any means. All four principles are needed but only if a *fifth* principle is also met will it be read: namely it must be offered at a price that can be afforded. With Nicolas Culpeper's publications all of these 5 principles came together.

The First Principle – a body of medical information

The body of medical information was available: there were herbals, medical and surgical texts most, but not all, published in Latin. Many had in fact already been translated into vernacular English. The London College of Physicians' *Dispensatory* (*op cit*) included approved drugs and how to prepare them, usually herbs but since 'Paracelsus', the renaissance physician and alchemist, other chemicals too. This was an essential Latin text for apothecaries making up prescriptions. The translation Culpeper made was unauthorised and the College strongly argued against it. There were already a number of herbals that had been written in or translated into English, such as William Turner's *A New Herbal* published in 1551.

Culpeper published a *Directory for Midwives*, (*op cit)* in which he not only stated commonly held beliefs but asked the readers to offer him advice and other points so that he could make amendments for future editions. Latin was still the language used by physicians to 'protect their trade'[6] but there was a steady increase in the amount and availability of vernacular titles published in England with a significant increase between 1640 and 1650.[7]

A body of knowledge was therefore in place. Culpeper did not agree with all indications cited by previous authors of herbals and some experienced physicians and he offered guidance when there might have been doubt. The language used in the *Complete Herbal* is straightforward although some uses and indications can seem confusing to a modern reader: for example to 'consolidate the veins', 'defends the heart against the noisome vapours of the spleen', or 'pin and web in the eyes'. It is however likely that these would have been understood by the people it was intended for.

When the College of Physicians lost their influence over licensing medical books in the middle of the 17th century due to the political upheaval of the time, English vernacular publishing flourished. It was estimated that due to the small number of licensed physicians in London in 1600 and the high prices for their attendance, books used by the people could have a run of 1000 for each of a number of editions.[8] Ordinary people were able to make up their own medications based on the herbals but particularly so after Nicholas Culpeper translated the College's *Dispensatory* and made available the *English Physician Enlarged* as part of the *Complete Herbal.*

Exact methods for preparing remedies were shown and, although some needed specialist equipment, most could be attempted in the household. Other books tended to attract a high price due to their expensive plates and

*The Levellers were a political movement during the English Civil Wars which emphasised popular sovereignty, extended suffrage, equality before the law, and religious tolerance.

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woodcuts of plants and were intended more for the apothecaries and any physicians who were not fluent in Latin. In *Galen's Art of Physick* (1652), quoted in Sanderson,[7] Culpeper continued to rail against the College of Physicians as they adhered to Latin:[7]

> Lest as they say, you should do yourselves a mischief by them [self prepared medicines] when indeed the truth is their own gain and credit lies at stake, people would not adore them and employ them and spend their whole estates upon them as now (poor hearts) they are often forced to do.

Although most medical books published in England in the 16th and 17th centuries were in English, not Latin, there were many who considered Latin essential to ensure that medical knowledge was limited to the few educated physicians. This was justified on the grounds 'that it discouraged unlearned and hence unskilled practitioners and preserved the integrity of classically based medicine'.[9] Physicians' fees could be lost if everyone understood the language of medicine. Culpeper defended his use of English thus:[7]

> The works of God, [the herbs], abundant in the garden and hedgerows, were common to all to view and benefit from.

Physicians sought to hide the benefits, and protect their knowledge, by using Latin.

The Second Principle – a willingness and ability to make medical information accessible

For the second principle to be met, there needed to be willing and able people to render the information accessible. Culpeper had been educated in the Arts both before and at University, as was normal prior to any specialisation. He could understand and write Latin and with his political leanings towards the Parliamentarians and the Levellers, the willingness was there. From childhood he had been interested in herbs, gathering them with his family from gardens near where he lived.[10] His apprenticeship to apothecaries made him aware of the methods of production of simples, ointments and other dosage forms and had introduced him to prescriptions written by physicians. As a man with Leveller sympathies, he wanted 'God's works', in which he included the knowledge of herbs and their use, to be available to everyone. Wherever he could, he criticised the physicians for keeping their secrets to themselves. Under the monograph for dandelion, for example, he states

> You see here what virtues this common herb hath and that is the reason the French and Dutch so often eat them in Spring and now, if you look a little further, you may see plainly without a pair of spectacles that foreign physicians are not so selfish as ours are but more communicative of the virtues of plants to people.

The Third Principle – the need for a format that people can access

The third principle, where the format of the information is important, was easily met. A number of disparate developments improved the opportunity for Culpeper to achieve his ambition of letting the people help themselves as far as health was concerned. Medical literature had been available since the 14th century and with the development of the printing press the availability increased significantly. At the beginning of the Civil War, due to many changes in parliamentary regulations including the abolition of the Star Chamber, there was a significant increase in the printing of pamphlets and books, and medicine was of great interest to everyone. Many of these would be for the use of trained apothecaries but others were recipes for various herbal mixtures and salves.[9] Siebert quotes from the Thomason collection in the British Museum which states that although only 22 pamphlets were published in 1640, more than 1000 were issued in each of the succeeding four years.[11] The record number was 1,966 in 1642. Of course, given the turbulent times, most of these related to the King and Parliament but medical texts were also increasing to meet the demand of ordinary people for information.

In the *Complete Herbal* Nicholas Culpeper not only described each herb and where and when it grew but considered each of its indications. He then described how to make an appropriate dosage, ensuring external preparations were made up as ointments and internal as syrups, electuaries, simples (with one ingredient) or compounds.

The Fourth Principle – a literate population

Fourth was the necessity of a literate population which was, perhaps, more of an issue. London, where Culpeper practised, had the highest level of literacy in England in the mid 17th century at about 70% of the male population.[12] In other parts of the country it was much lower and the average for the country was only around 10%. There was also a range from parish to parish. It is difficult to see how medical information was of use to the family when the main provider of medicaments was the, probably illiterate, woman of the house. Much of the medical information available was traditionally passed down from one person to the other by oral tradition. However, Sanderson[7] suggests that nationally 10% of women were literate but in London it was between 15 and 20%. Sanderson also suggests this may have been even higher as there were many books being published for a lay audience and a female readership.

A new Fifth Principle – available at a price that is reasonable

The fifth principle is that those who needed the information and could read should be able to afford it. Doreen Everden-Nagy, quoted in Sanderson[7], stated that the average physician's fee at this time would be between 6s 6d [32p] and 10s [50p] while the wage of craftsman was 12d [5p] a day and the labourer 8d [3.5p] a day. To buy books would normally be out of the question for the latter, although pamphlets and broadsheets would be a possibility, unless the price of the book was kept particularly low. As has been mentioned, there had been translations of herbals prior to Culpeper. For example, Sanderson mentions William Turner's *A New Herbal in three parts,* but with their expensive plates and woodcuts they were beyond the pocket of most of the population.[7]

The library of the physician John Webster (1611-82) catalogued in June 1682 contained a copy of an octavo edition of Culpeper's *English Physitian* valued at 2 shillings while at the other end of the scale his copy of Parkinson's *Theatrum Botanicum* was worth £2.15s. [£2.75].[7]

It was Culpeper's belief that these English folio herbals were prohibitively expensive which led to his preparation

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of the *English Physitian*. Culpeper complained that 'this such a price that a poor man is not able to buy them'.[7]

Culpeper charged very little for his works but more importantly, all his recipes contained commonly available English garden or hedgerow plants that could be gathered by anyone. The method of production was also clearly stated so there was no real need to involve a third party unless specific equipment was recommended.

Illness and the Fear of Illness

Illness was a serious matter, then as now. James I had probably died from a surfeit of physicians and Charles II probably died likewise. People suffered from conditions we can recognise today, but some seemed either much more prevalent or more serious, such as stones in the kidney, liver and bladder, where surgery was literally the last resort except for the very lucky few such as Samuel Pepys.[13] Childbirth and pregnancy were also potentially fatal, which may be why 88 herbs in the *Complete Herbal* were recommended for stones and over 250 for various conditions associated with childbirth, 'travail of the mother through expelling a dead child or afterbirth' to improving or reducing milk production.

What were people so afraid of that might encourage them to use herbs and herbals? Overwhelmingly, childbirth and the whole act of being and getting pregnant were significant causes of distress and death. Herbs were offered for all aspects of gynaecology and obstetrics: 67 herbs act 'to provoke women's courses' (menses), 36 to stop them; four aid conception and two prevent it. Others were thought to cause abortion, though the monograph strongly urges against their use for this purpose, describing uses for other conditions and warning that abortion might be a consequence.

Fear of the plague and pestilence in general would have been real around the time of Culpeper and people needed information in simple English to help prevention and treatment including the removal of scabs from survivors. Nicholas Culpeper would have been well aware of this and a cynic might suggest a vested interest, as such straws to clutch at could be bought from his shop. Others would detect a growing disillusionment with those physicians who would not visit the poor with pestilence and a growing belief that the people should be educated to help themselves – cheaply.

Could the treatments offered have been useful?

If kings could die, was medicine in any way evidence based? Rarely in the analysis of Culpeper's complete herbal are herbs recommended for conditions where we now have evidence of their effectiveness. Foxglove, for example, is not recommended for heart disease in *Culpeper's Complete Herbal*, nor is St John's Wort considered as a treatment for melancholy.

Most of the herbs seem at best to be ineffective, and in some cases potentially harmful, but the placebo effect and the belief in providence to protect the individual from life-threatening conditions such as plague must both have been very strong. Of the 331 herbs discussed in the *Complete Herbal* some would have little or no effect other than perhaps as a soothing agent for a sore throat or to prevent itch. However, when it came to infections such as quinsy, a recommended herb such as agrimony is still mentioned in modern herbals as having the property to help inflamed gums and sore throats and as being gently astringent. Agrimony contains terpenoids and phenolic acids which might be considered useful for topical application to sore throats but evidence for effectiveness is not available.

Whereas today's medicines generally have one or two indications described and explained in patient information leaflets, herbs were thought to have many unrelated and disparate uses in the 17th century, and to a lesser degree today. Taking the example of agrimony again, as well as quinsy it was recommended for hard tumours of the breast, cachexia (a wasting syndrome), dropsy (possibly heart failure), yellow jaundice, obstructions of the liver and spleen, imposthumes (abscesses) provoking urine and women's terms, killing worms particularly in children, itch, scabs, and things related to lungs. In modern herbals agrimony is still considered useful as a tonic, an astringent, healing peptic ulcers, controlling colitis, regulating functions of the liver and gall bladder, gallstones, cirrhosis, gout, rheumatism, bleeding, profuse menstruation and many others. In one of the most important sources of evaluated information on herbs, the Natural Database,[15] agrimony is said to be used orally for sore throat, upset stomach, mild diarrhoea, irritable bowel syndrome (IBS), diabetes, gallbladder disorders, tuberculosis, bleeding, corns, warts, as a gargle, antitumor agent, cardiotonic, diuretic, sedative, and antihistamine. Topically, agrimony is used as a mild astringent and for mild skin inflammation. The ethanolic extracts of agrimony are used for their antiviral property. However this reliable source states clearly that 'there is insufficient reliable information available about the effectiveness of agrimony'. Perhaps modern medicine has lost this broad approach, at least in its medical information and patient information leaflets, yet even drugs with one main indication such as aspirin may well have many other actions that were not originally considered important. Magic bullets are rare indeed.

If a full analysis of Culpeper's *Complete Herbal* is compared to the causes of death recorded at the time,[9] the conditions for which Culpeper reviewed herbs cover virtually all those listed except, not surprisingly execution, murder, suicide and 'found dead'. However it is of interest to note that deaths were attributed to sciatica, stich, cramp, teeth and worms but what the underlying cause of death was in each of these cases is not recorded or perhaps not known.

Conclusion

Making information available to the public in a way that they can understand is as important now as it was in 1654 when Culpeper's *Complete Herbal* was published. Research continues to aim at producing information in the format best read, understood, and acted upon. Nicholas Culpeper, educated and with a substantial

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legacy of translation and original works of medicine published in a language the people could understand and afford, died in 1654 at the age of 38. Three hundred and fifty years later we still use Latin in medicine and pharmacy though not so obviously and not always to obfuscate. Information to the public is available in forms that can be understood and are often free, such as Patient Information Leaflets (PILS).

Whilst we might today consider ourselves knowledgeable and wise and mock early attempts to treat disease, there is still much ignorance about how to treat diseases. We are able to research and develop the best methods of providing medicine information that is most easily understood by the user. We also have more methods of accessing information such as paper, via the internet, television etc, but just as in Culpeper's day, health professions still hold power over the knowledge and users still need the help of health care professionals to interpret information to make best choices.

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Cosmetics for eternity in ancient Egypt

Andrew Hardy* and Gavyn Rollinson**

*Centre for Medical History, College of Humanities, University of Exeter, Exeter, Devon, UK

**Camborne School of Mines, University of Exeter in Cornwall, Tremough Campus, Penryn, Cornwall

The ancient Egyptians took their eye cosmetics ('kohls') with them into the afterlife. Such funerary items are found in many of their excavated tombs regardless of status. In middle and high status tombs cosmetic chests have been found (e.g. see Figure 1),[1] which contain the kohl pots often seen individually in tombs of lower status. Eye paint was regarded as an essential funerary gift as it was regarded as being essential for both the resurrection into the afterlife *and* as part of a purification process prior to being judged in the 'Hall of Justice'.[2]

Figure 1. A New Kingdom tomb cosmetic chest.

If the deceased was important/rich enough then there was also a tomb-chapel, which was open to (mortuary) priests and visitors/descendants. The walls would usually be decorated with allegorical scenes concerning the gods and also with images taken from the life of the deceased. The priests would pray for the departed spirit ('ka') and offerings of food, drink, toiletries etc would often be provided, usually by family, visitors or by the priests. However these offerings, after being consecrated to the spirit, would be removed later by the priests as payment for their services. Over time the tomb-chapel could become a temple-cult-ritual centre where regular offerings (and requests for divine intervention) were

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made to the deceased's spirit *and* to one or more of the gods.[3]

Green was the first colour to be used as a funerary eye cosmetic, then green *and* black (either separately or together) and finally only black. The dates of their predominant occurrences are from: the earliest predynastic to the start of the (proto)dynastic period (5500 to c. 3100 BC)[4] for green, the 1st to 10th dynasties (c. 3100 to 2025 BC) for green and black, and the Middle Kingdom (started 2025 BC) onwards for black alone. Green was occasionally found in later Middle Kingdom (MK) and New Kingdom (NK, started 1550 BC) tombs, with the latest dynasty where it was found being the 19th (1295 to 1186 BC).[5]

Before this publication 131 ancient Egyptian kohl samples have been chemically characterised and the results published in the (English language) literature. Here we give only a summary of the types of compounds found and their variations in colour. Thus, overall, the following numbers of various metal-based compounds/ minerals have been found to be the main components in the 131 kohl samples analysed: 97 lead-based (black/grey-black (87, all of which were galena) and white/grey-white (10); 11 manganese-based (black/grey-black); 10 copper-based (green/blue-green (9) and black (1)); 9 iron-based (brown (7) and black (2)); 3 silicon-based (brown) and 1 antimony-based (black). The details of the analytical results can be found in the references listed in the Endnotes and References section.[5,6,7,8,9,10,11,12,13,14]

However, only occasionally is tomb information included with the published results of the chemical composition of ancient Egyptian kohl samples. We have managed to find only two English-language publications where tomb information is included with the kohls' chemical analytical results. One article, where seven kohl samples were chemically characterised using modern spectroscopic techniques, gave (in its Supplement) tomb information on four of the kohl samples' containers. All four containers were dated to the NK; where three were from Lady Touti's tomb at Medinat el-Gorab (Fayoum, also Faiyum) and one from a tomb at Deir el-Medineh B (on the west bank of the Nile, opposite Thebes).[15] The second article, where 32 kohl samples were analysed by 'wet chemistry', had a total of ten samples where some tomb information was given. Five samples were listed as coming from 'the tomb with amulet of Nefertari' at Gurob and were dated to the 19th dynasty, and the other five as coming from 'the tomb of Maket' at Kahun (also Lahun) and dated to the 19th or 20th dynasties (the 20th dynasty being from 1186 to 1069 BC).[16] Additionally, a paper giving LIA (lead isotopic analysis) data on 17 ancient Egyptian kohl samples has tomb information for 5 of the samples.[17] Four of the samples were found in tombs at Abydos and were dated to the 11th and 12th dynasties (2055 to 1985 and 1985 to 1795 BC respectively). The fifth sample was from a tomb at Qau and was dated to the 7th to 8th dynasties (i.e. 2181 to 2125 BC). However it is unclear if actual chemical analyses were done prior to the LIA work; it may be that as the samples were black and that galena was known to be a common major component, then its presence may have been assumed.

It should be mentioned that an inventory of the contents of every tomb excavated at a particular site is not always given in the archaeological excavation reports of the late 19th and early 20th centuries. Also, even if a list of objects is given for a numbered tomb, then sometimes this list is incomplete. This 'missing' information is partly a result of data (or even objects) being lost between the actual excavation and the writing of the report (which could be several years later), but mostly arises from the sheer number of objects found, which could number many thousands, and so there simply was not enough space in the report to list them all. Full excavation reports, where *all* objects found are listed both in image and text, only became possibly relative recently with the arrival of digital photography and electronic databases.

New samples

We have recently analysed four kohl samples from the Egyptian collection of the Museum of Archaeology and Anthropology (MAA) in Cambridge (UK). All of these

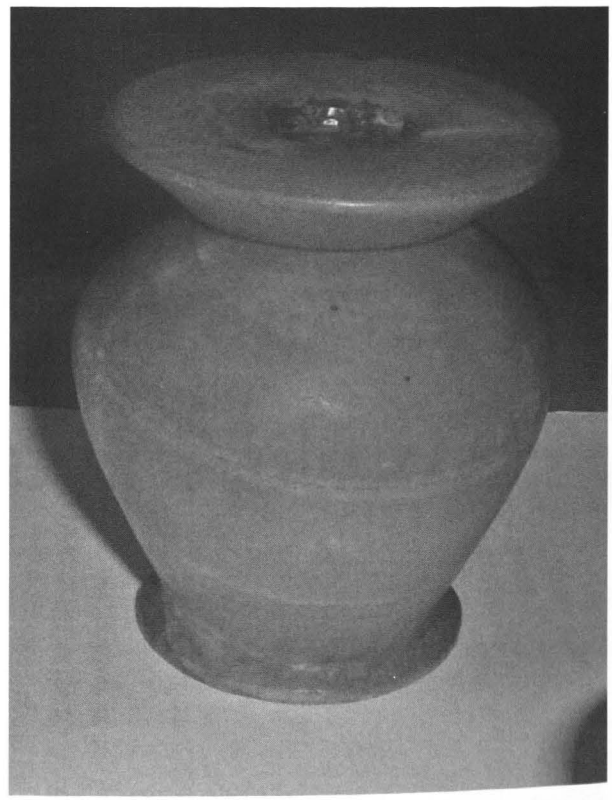

Figure 2. A typical (MK/NK) 'hour-glass' kohl pot.

samples come from containers (kohl pots) that are well provenanced, have been assigned dates *and* a tomb number. These samples were chemically characterised using two analytical techniques. Quantitative elemental composition was given by the technique of Low Vacuum Scanning Electron Microscopy (LVSEM), and semi-quantitative identification of the crystalline compounds present by the X-Ray Powder Diffraction (XRPD) technique. A third technique was additionally used for the

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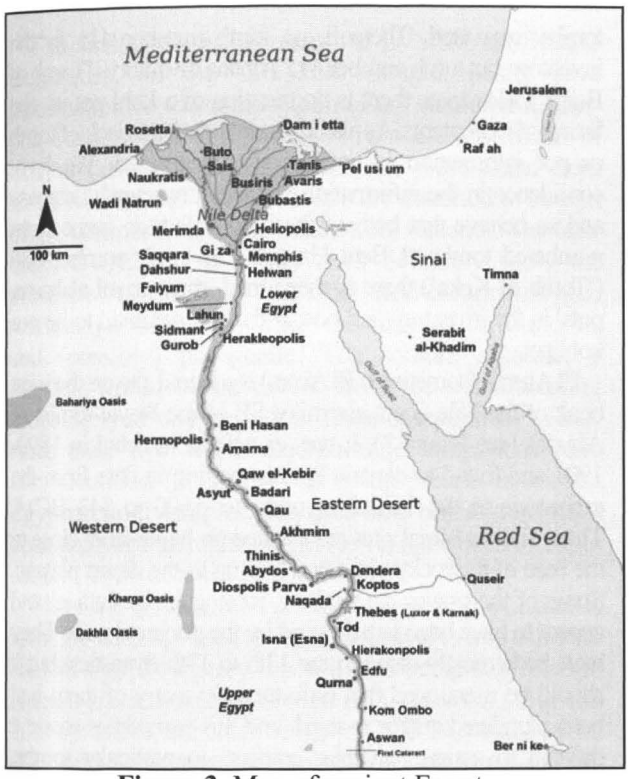

Figure 3. Map of ancient Egypt.
(After: Jeff Dahl, Wikimedia Commons)

analysis of a fifth kohl sample, whose pot (and sample) has been labeled by us as LP1 and which had been recently obtained by one of us (AH). This third analytical technique was Quantitative Evaluation of Minerals using Scanning Electron Microscopy (QEMSCAN), which gives quantitative identification of the minerals/inorganic compounds present (crystalline *or* amorphous) and which can also be used to do detailed interactive work on specific compounds/groups of compounds.[7,8]

The museum's accession number of each of the four kohl pots, from which we removed a small sample for analysis, is used to label each sample. Also given is the site where the kohl pot was found, its assigned date and tomb number. A picture of a typical MK/NK 'hour-glass' shaped kohl pot is shown in Figure 2 (of approx. dimensions: height (H) 6.5 cm and maximum width (MW) 5.0 cm). This type of pot is found for three of the four tomb kohl containers. Also shown is a map of ancient Egypt (Figure 3). Figure 4 is a picture of the kohl pot labeled LP1. The analytical results for each of the four tomb samples are given in the following way: first the LVSEM results (in decreasing order of elemental weight percent, with the elements in brackets being at less than 1% each, and any element in [...] brackets was found in a later spot scan at a percentage of less than 1%), then the results of XRPD (with approx. percentage presence values given in brackets after each compound found). Where a LVSEM spot scan is an analysis over a circular 'spot' of only 2 to 3 μm in diameter; which compares with a normal ('area') scan over a rectangle of 200 to 400 μm a side. For sample LP1 the LVSEM and XRPD results are given in the same way, and then followed by the QEMSCAN results.

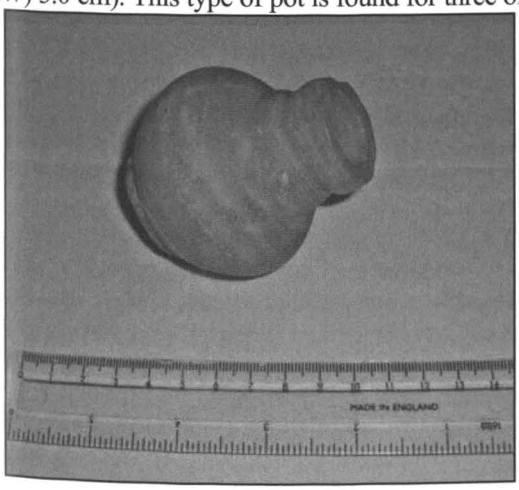

Figure 4. Kohl pot LP1.

Results

Sample Z15217B. Its pot was found at Beni Hassan, was dated to the Middle Kingdom (MK) (2055–1650 BC; that is covering the period from the 11th to 14th dynasties inclusively) and was listed as being from tomb number 880. The sample was black in colour. The pot was said to be (in the museum's database) made of calcite. In shape it is smoothly tapered from a shallowly incised top rim to a flat base, with approx. dimensions of 3.4 cm (H), 3.6 cm (MW) and a base width (BW) of 1.0 cm.

LVSEM: Pb, C, O, S (Zn, Ca) [Cl].

XRPD: Galena (PbS) (67), laurionite ($Pb(OH)(Cl)$) (16), calcite ($CaCO_3$) (8), anglesite ($PbSO_4$) (4), phosgenite ($Pb_2(CO_3)(Cl)_2$) (3) and sphalerite (ZnS) (2).

Sample Z15227F. Its pot was also found at Beni Hassan, was dated to 'before the 15th dynasty' (started 1650 BC) and was listed as being from tomb number 412. The sample was grey-black in colour. The pot material was said to be (in the museum's database) 'alabaster', which in this context is assumed to mean calcite rather than gypsum ($CaSO_4.2H_2O$). Its shape is the often seen 'hour-glass' one (see Figure 2); with approx. dimensions of 3.1 cm (H) and 3.5 cm (MW).

LVSEM: C, O, Pb, S, Ca, Zn, P (Cl, Si, Fe, Al).

XRPD: Galena (78), sphalerite (7), laurionite (6), calcite (5) and anglesite (4).

Sample Z15228. Its pot was again from Beni Hassan, was dated to the MK and was listed as being from tomb number 411. The sample was grey-black in colour. The museum's database said the pot material was calcite. The pot is again 'hour-glass' in shape, with approx. dimensions of 4.3 cm (H) and 4.0 cm (MW).

LVSEM: O, C, Si, Pb, Al, Ca, Fe, S (Mn, K, Mg, Cl, Ti).

XRPD: Quartz (SiO2) (63), calcite (24), galena (5), anglesite (2), sphalerite (2), anhydrite (CaSO4) (2) and gypsum (2).

Sample Z15229. Its pot was found at El Amrah, dated to the 13th-17th dynasties period (i.e. 1795-1550 BC; that is the last two dynasties of the MK and all of the 2nd Intermediate Period) and was listed as being from tomb number 88. The sample was grey-black in colour. The museum's database said calcite for the pot material, and

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its 'hour-glass' shape has approx. dimensions of 3.6 cm (H) and 3.5 cm (MW).

LVSEM: C, O, Pb, S, Ca (Zn, Fe, Si, Cl, Al).

XRPD: Galena (75), sphalerite (10), laurionite (6), quartz (4), calcite (3) and gypsum (2).

Sample LP1. The provenance of this sample's pot is unknown. It has been provisionally dated to the Late (Dynastic) Period (i.e. c. 600 BC).[18] Its shape is shown in Figure 4, and it has dimensions of 6.4 cm (H) and 5.9 cm (MW). It had been described, by a previous owner, as a "bulbous 'banded alabaster' pot". The small amount of kohl present in the pot was black in colour.

LVSEM: O, Ca, C, Si, Pb, S, Al, K, Cl (Fe, Mg).

XRPD: Calcite (94), gypsum (2), quartz (2) and an unknown compound (probably a silicate) (2).

QEMSCAN: The initial results confirmed the above XRPD results, and also showed the presence of several other compound/groups of compounds (e.g. various silicates). We subsequently did detailed interactive work on the data collected, looking specifically for the presence of lead compounds (which were assumed to constitute the kohl material). Galena was found as discrete particles (of average size 3.6 μm) *and* one or more lead-chlorine-oxygen(-carbon?) compounds were also found in larger particles (of average size 6.2 μm) combined with galena. Also, *possibly* present in these larger particles was sodium chloride (NaCl). The calculated overall percentage presence of the lead compounds was low, being only 0.21 percent of the sample.

Discussion and conclusions

Beni Hassan is a large necropolis, covering several burial sites over a north-to-south distance of about 15 miles, on the east bank of the Nile about 120 miles south of Memphis (see Figure 3). The sites were first excavated in detail in 1902-04.[19] The burial sites vary in date from third (or perhaps earlier, where the third dynasty started 2686 BC) dynasty at the most northern end to thirtieth dynasty (started 380 BC) at the most southern end. All the tombs can be described as 'rock tombs'; that is they were all cut into the rocky cliffs that are about one mile from the east bank of the Nile.

One of the sites contains tombs of middle-to-high ranking people of the Middle Kingdom, and this area is sometimes referred to as the 'Great Necropolis of the Middle Empire' or as the 'Gallery of Rock Tombs of the Nomarchs'. The latter name refers to the largest of these MK rock tombs; where there are mortuary chambers as well as the actual tomb chambers of local chieftains and princes (or 'Nomarchs' as the chieftains of the 'nome' or district have come to be called). Below them are the smaller tombs of their courtiers and officials. A total of 888 such tombs were found during the excavation of the 'Great Necropolis'. Almost all of these (ie 800 of the 888 found) tombs are of the same simple design: that is, a small shaft (about a metre square) descending vertically through the rock (for from 3 to 10 metres) and at bottom a small chamber recess (with a maximum dimension of about 2 metres) for the coffin and funerary artefacts.

The inventory of objects found within the tombs, in the excavation report, does not include the contents of all the tombs excavated. There is no tomb number 411 in the inventory, but tomb number 412 is in the inventory ('Tomb of Baqta'). However, there is no mention of a kohl pot in the listing of its contents. As already mentioned, this lack of tomb or pot information is not entirely unexpected. We have confidence in the information from the museum's database and so believe that both of these kohl pots *do* come from numbered tombs at Beni Hassan. For tomb number 880 ('Tomb of Keka') there is mentioned 'three small alabaster pots' in the inventory and one of these is assumed to be our kohl pot.

El Amrah (sometimes El Amra) is a burial site on the west bank of the Nile about six miles SE of the Royal tombs of Abydos (see Figure 3). It was excavated in detail in 1899-1901 and found to contain burials ranging in date from the prehistoric to the thirtieth dynasty (c. 5500 to 343 BC).[20] These various burial sites are situated on 'table-land' close to the base of the rocky cliffs that lead up to the desert plateau. Some of the graves are shallow, rectangular in outline, and appear to have been largely used by the poorer classes. They have been mostly dated to the 13th to 17th dynasties; but it should be mentioned that unfortunately many of them had been plundered and/or re-used, and this sometimes made it difficult to assign particular artefacts to particular tombs. Tomb number 88 is listed in the excavation report and amongst its contents is mentioned a 'small limestone kohl pot'; which would be our 'stone calcite pot', as described in the museum's database.

Our four tomb kohl samples all have galena (PbS) present, usually as the main component. One sample (Z15228) has quartz as its main component and its presence is assumed to be a result of contamination by (local) sand. Galena is present, but only at about a 5% presence. In all four samples calcite is found, and this is taken to be pot material. Similarly the small amounts of anhydrite and gypsum sometimes found are also taken to be pot material as they are often mineralogically associated with deposits of calcite. Sphalerite, found in each sample, is known to be associated with galena ore from the eastern desert.[21] Anglesite is a common oxidation/weathering product of galena and its occasional presence is to be expected. The only remaining compounds found in three of the four samples are one or both of the 'made' lead-chloride compounds laurionite and phosgenite. In the fourth sample, where quartz is the main component, neither of these compounds could be detected from its XRPD data. However, a detailed search using the LVSEM technique *did* find small amounts of chlorine *and* when found it was associated with the presence of lead. Thus we have *tentatively* assumed that one or both of these lead-chlorides *are* in fact present in this sample.

Much has been written, by us and others, concerning these two 'made' lead compounds. Suffice to say here that: (a) it is currently assumed that they were made in the same way as is described in later Roman texts; (b) they were used for aesthetic, hygienic, therapeutic/prophylactic and religious reasons, and possibly for more than one of these uses at one time; and (c) as far as is currently known (but see below) they were made only between c. 2000 and 1200 BC.[6,11,22,23]

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The analytical results, using the LVSEM and XRPD techniques, on the LP1 kohl sample mostly gave information on the composition of its 'banded alabaster' pot, namely that this pot is almost entirely made of calcite. Lead and associated chlorine were found from LVSEM data and these elements are assumed to be part of the composition of the actual kohl material. The later detailed QEMSCAN work *does* definitely show the presence of galena *and* of lead-chlorine-oxygen (carbon?) compounds which are taken to be laurionite and (possibly) phosgenite. The sodium chloride, *if* present, would be its excess from the manufacturing process(es) of one or both of these compounds.[23] Thus, since these two 'made' lead-chloride compounds were first identified (in 1999)[15] as being present in ancient Egyptian kohl samples, fifty-five lead-based kohls have been analysed and thirty-eight (69%) have been found to contain some of at least one of them.[24]

The Late (Dynastic) Period (747 to 332 BC, that is from the 25th to 31st dynasties inclusively) was a time in ancient Egypt's history when it was being subjected to Nubian (25th dynasty, 747-656 BC), Assyrian (25th and 26th dynasties, the latter being 664-525 BC) and Persian (27th and 31st dynasties; being 525-404 and 343-332 BC respectively) influence/conquests. Also, from the 26th dynasty onwards Egypt was increasingly drawn into the Classical and Hellenistic sphere of influence, culminating in the presence on Egyptian soil of the conquering armies of Alexander the Great in 332 BC.[4]

There is no evidence, in the archaeological record, of eye diseases in ancient Egypt as the organic eye tissue has long since decomposed. However, it *is* thought that eye diseases, such as trachoma, were prevalent or even endemic in the lives of the living. The dust, flies, malnutrition (e.g. iron deficiency), occasional polluted water and the general hygienic/sanitation conditions would all have played their part in the presence (and transmission) of eye diseases.[25,26]

Over a hundred recipes for treatment of problems of the eyelids, iris, and cornea, as well as trachoma (probably the *nehat*-disease) and conjunctivitis, are listed in their medical papyrii, especially in the Ebers papyrus. Many of these recipes include 'black eye paint' (taken to be galena). Other compounds/minerals mentioned, such as: *sia*-mineral from Upper Egypt, *tjeru*-mineral and the 'male part of galena' have not yet been identified. One *could* be one (or both) of the 'made' lead-chloride compounds. It has also been very recently shown that these 'made' compounds could well have had a positive effect when used to treat eye diseases.[22,23,25,26]

We owe a large amount of our knowledge of ancient Egypt's civilisation to the materials they left behind in their tombs. Nearly always included as funerary goods were eye cosmetics. These ranged from expensive elaborate cosmetic chests with a multitude of pots and implements to a simple lump in a shell. Our four tomb kohl samples have been found to be very similar in chemical composition to kohl samples from the MK/NK previously analysed. All four are black/grey-black in colour, have galena present *and* three definitely have one or more of the 'made' lead-chlorides (laurionite and phosgenite) present, with their presence only being tentative for the fourth sample. There is not (yet) any known correlation between the presence of these 'made' compounds in a kohl sample and the status or location of the tomb where the kohl pot was placed. Perhaps it was just a matter of market forces, and those who could afford to obtain the best for the afterlife did so? Or, perhaps, a medicine/prophylactic against eye disease in the afterlife? Eye disease (eg trachoma) is thought to have been prevalent/endemic in life in ancient Egypt, so perhaps what had been used for the eyes in life was also made available for the spirit in the afterlife?

We also analysed a kohl sample that has been *provisionally* dated to the Late (Dynastic) Period (c. 600 BC) and have obtained results that show the presence of both galena *and* of one or more lead-chloride compounds. This shows, if our dating of the kohl pot is confirmed, that the ancient Egyptians were making lead-chloride compounds for longer than previously thought, that is for an extra (approx.) six centuries longer, extending from c. 1200 to c. 600 BC. Further work on other kohl samples that are reliably dated to later than c. 1200 BC needs to be done, and we await with interest the results.

It is believed that the ancient Egyptians utilised the *best* products of their civilisation as funerary gifts for the afterlife. What was left behind for later archaeologists to find was very probably the best, or even better than, that which had been used by them when alive. Preparation for the afterlife was taken very seriously.

Acknowledgements

We would like to thank all the staff, past and present, of the Museum of Archaeology and Anthropology (MAA) in Cambridge (UK), for all their help with this project. Also, we would like to thank the staff of the Chemical and Materials Analysis Unit (University of Newcastle, UK) for most of the experimental LVSEM and XRPD work mentioned in this article.

Author's addresses: Corresponding author: Andrew Hardy BSc, DPhil, Centre for Medical History, College of Humanities, University of Exeter, Exeter EX4 4RJ, Devon, UK. E-mail: A.D.Hardy@exeter.ac.uk; Gavyn Rollinson BSc, MSc MSCM, PhD, Camborne School of Mines, College of Engineering, Mathematics and Physical Sciences, University of Exeter in Cornwall, Tremough Campus, Penryn TR10 9EZ, Cornwall, UK. E-mail: G.K.Rollinson@exeter.ac.uk .

Endnotes and references

1. This cosmetic chest is a wooden (sycamore) box from the tomb of Merit (sometimes Meryt), wife of Kha, excavated in western Thebes in 1906. It dates to the New Kingdom. The picture was obtained from the Wikimedia Commons web-site.

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3. Ikram S. Afterlife Beliefs and Burial Customs. In: Wilkinson T (ed.), *The Egyptian World.* UK: Routledge, 2007: 344-350.

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4. All the dates used in this article (plus the general information on the Late (Dynastic) Period) are from: Nicholson PT and Shaw I. *British Museum dictionary of ancient Egypt.* London: British Museum Press, 2nd edn., 2008: 177-178, 350-354; and references therein.

5. Lucas A and Harris JR. *Ancient Egyptian Materials and Industries.* New York: Dover Publications, 4th edn, 1962: 80-84, 243; and references therein.

6. Some ancient Egyptian cosmetics from the Louvre have been analysed, using modern synchrotron spectroscopic methods, by a group funded by L'Oreal and the French Government. The only English-language summary of results to date, for 37 samples, is in: Dooryhee E. Advances in Art and Archaeology using X-ray synchrotron radiation. In: Tsoucaris G and Lipkowski J (eds), *Molecular and Structural Archaeology: Cosmetics and Therapeutic Chemicals*. Netherlands: Kluwer Academic Publishers, 2003: 201-209.

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14. Thus the 131 ancient Egyptian kohl samples analysed consist of: 74 done by 'wet chemistry' and summarised in reference 5; and done by modern spectroscopic techniques there are 37 done by the Louvre-based researchers, which are summarised in reference 6; and 20 done by ourselves (references 7 to 13).

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24. These numbers are made up as follows: for the number of lead-based kohls analysed since 1999 we have thirty-seven from reference 6 plus a total of thirteen from references 7, 9, 10 and 11, and another five from this article. For the number containing one or more of the two 'made' lead compounds we have twenty-nine from reference 6, one from reference 7, three from reference 11 and five from this article.

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Contents

Diary

Please note that for 2012, evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise noted.

Monday 8 **October 2012**
To be confirmed.

Thursday 1 November 2012
'Medieval Hospitals and Early Pharmacy in Europe' by Dr Pat Cullum, University of Huddersfield. Joint Meeting with Huddersfield School of Pharmacy at Huddersfield. Details later.

The History of Wellcome
The lecture given by Prof. Tilly Tansey at the BSHP meeting on 14 May 2012 can be seen at the following Webex address:
https://rpsmc.webex.com/rpsmc/ldr.php?AT=pb&SP=MC&rID=16229132&rKey=70630F3C83D5E5A1

The History of Doping in Sport
The lecture given by Prof. Tony Moffat at the BSHP meeting on 18 February 2012 can be seen at the following Webex address:
https://rpsmc.webex.com/rpsmc/ldr.php?AT=pb&SP=MC&rID=14847597&rKey=577829C9C895D5E7

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Book Review

Scottish Medicine: An illustrated History.
Helen Dingwall, David Hamilton, Iain Macintyre, Morrice McCrae and David Wright. Edinburgh: Birlinn Ltd, 2011. 286 pp. RRP £30.00
ISBN: 978 1 78027 018 0

It is over seventy year since the publication of a definitive history of Scottish Medicine. Because of the significant advances that have occurred in the practice of medicine and also in the presentation of history, the arrival of this volume is both a welcome and timely addition to our literature.

The text is divided into five chapters, each written by a major contributor to Scottish medical history. The story starts with the period from the Ice Age to the Reformation. This is then followed by chapters covering the Renaissance up to 1750, the period of the Enlightenment up to 1850, which saw the movement of the population from the country into the towns, and the growth of State aided medicine. The introduction of the National Health Service and the nature of health care in the twentieth century rounds up the final chapter. The growth in knowledge of medical practice, the improvement in treatment and the contribution of those engaged in medical practice is covered in this fascinating history.

The text is considerably enhanced by the inclusion of over 250 black and white and coloured pictures covering every aspect of medical history. The illustrations are particularly rich in portraits of many of the pioneers of Scottish medicine; from Robert Sibbald and Archibald Pitcairnie of earlier times to James Y. Simpson, Joseph Lister and Sir John Boyd Orr of more recent history.
This is a history of Scottish Medicine, but throughout this period there was a constant interchange of people and ideas with both the Continent of Europe and England. Scots made a valuable contribution to the advance of medical knowledge in Russia, the Americas and throughout the British Colonies. Equally, students from England who studied at Universities in the north returned to make a significant contribution to medical knowledge and advancement in England and many of their stories are followed in this history.

The text is aimed at the general reader as well as the specialist and will appeal to anyone interested in the advance of medical treatment. It can be thoroughly recommended as an essential volume for any bookshelf.

p.worling@virgin.net **Peter M. Worling**

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Jawarish, a Persian Traditional Gastrointestinal Dosage Form

Arman Zargaran[1,2], Mohammad M. Zarshenas[2], Ayda Hosseinkhani[2], Alireza Mehdizadeh[1]

[1]Research Office for the History of Persian Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

[2]Department of Traditional Pharmacy, Faculty of Pharmacy, Shiraz University of Medical Sciences

Medical sciences including pharmacy flourished in Persia throughout medieval times. The oldest pharmacopeias which discussed pharmaceutical formulations were created by them, called *Qarabadin*. Among various dosage forms which were described, *Jawarish* was a gastrointestinal dosage form which was made from different ingredients for different purposes such as stomach tonic, digestive, carminative, laxative, astringent, visceral analgesic, antihaemorrhoid, antiemetic, emetic, antireflux and anticolic. This paper, introduces their preparation, general considerations and five common examples of *Jawarish*.

Introduction

The history of medical and pharmaceutical sciences goes back to a very long time ago and has its roots in the ancient era even before the known human civilisation.[1] This knowledge grew among great ancient civilisations such as Persia,[2] Greece,[3] Egypt[4] and Byzantium.[5] Although it is widely accepted that pharmaceutical sciences became an independent branch of medical science in the 13th century AD, pharmaceutical science was discussed as a separate field in medieval Persia. For example, within many medical text books such as Avicenna's *Canon of Medicine*, written in the 10th century AD and taught in the western universities until the 17th century[6] there was a book just for pharmaceutical sciences.[7] Specific pharmaceutical books (pharmacopoeias), where the dosage forms are categorised and well explained in detail named *Qarabadin,* were created by Persian pharmacist-physicians as lists or a registry of drugs.[8] The first Pharmacopeia, *Qarabadin-e-Kabir* was written by Shapur Sahl (869 AD), a Persian pharmacist from Jondishapur Medical University.[9] These books contain procedures for drug preparations, routes of administration, considerations, therap-eutic uses, physical forms and target organs and each formulation is named accordingly.[10, 11] The present work is an attempt to introduce one of these categories which is named *Jawarish*.

Jawarish as a traditional dosage form

The term *Jawarish* is derived from the Persian word *Gowaresh* which means digestion.[12, 13] It is a semisolid traditional pharmaceutical dosage form[14] which is considered to be a kind of *Majoon* (confection or electuary). *Majoon* is made of powdered ingredients in a particular consistency of solutions of sugar or honey.[15] *Jawarish* is designed for the treatment of gastrointestinal disorders.[16] Based on their ingredients they were considered to have various gastro-intestinal therapeutic effects such as stomach tonic, digestive, carminative, laxative, astringent, visceral analgesic, antihaemorrhoid, antiemetic, emetic, antireflux and anticolic. In addition to their gastro-intestinal effects, some of them possess liver, cardiac and brain tonic, aphrodisiac and analgesic effects. It differs from *Majoon* by its better taste and odour of the ingredients.[14] It is mentioned in the traditional medical textbooks that the ingredients of these formulations should be powdered in a coarse particle size to ensure their longer stay in the stomach to act as a slow gastric tonic and a digestive medication.[16] *Jawarish* has a thicker consistency than *Majoon* so that, if it is dried, it could be broken into pieces by hand.[16] In a few *Qarabadin* books, it is observed that the formulation should be flattened and cut into cubes for easier patient usage.[17] A few *Jawarish* formulations are summarised in Table 1, p. 25.

General considerations

Each of the solid ingredients should be triturated on a stone and the minerals in an iron mortar to a coarse particle size.[13] If there are jewels as an ingredient of this dosage form it should be made into a fine powder.[13] Gum ingredients should be soaked in wine, Mukul myrrh in water and Ambergris in oil. When the formulation is prepared, it should be stored for a month to 40 days. It is remarked that only laxative *Jawarish* could be used immediately after preparation and did not need to be kept for a month.[13] If honey is one of the ingredients, the amount is three times that of other ingredients in the winter and twice in the summer. The preparation should be kept in a glass, silver, gold, china or tin container.[13]

Conclusion

In Qarabadin books traditional dosage forms have been well defined and categorised. In recent years the value of these formulations has been noticed and many clinical trials have been and are being performed by scientists all over the world; the ingredients of these formulations are being standardised. However, there are only a few studies in which the dosage forms have been investigated from a pharmaceutical point of view. The fact that different dosage forms have been specified for different systems and organs of the body with their own considerations shows the strong backbone of traditional pharmaceutical sciences. Jawarish is a good example of these types of formulation which focused on gastrointestinal disorders. It could shed a light on another part of the pharmaceutical history scene throughout the medieval time.

Corresponding Author: Alireza Mehdizadeh (MD, PhD - Assistant professor); Research office for the history of Persian medicine, North Ghaani Avenue, Shiraz, Iran; postcode: 71397 48479; tel/fax: +98 711 2304279; alireza.mehdizadeh@gmail.com; Arman Zargaran (PharmD, PhDc of Traditional Pharmacy): zargarana@sums.ac.ir; Mohammad M. Zarshenas (PharmD, PhDc of Traditional Pharmacy): zarm@sums.ac.ir; Ayda Hosswinkhani (PharmD, PhDc of Traditional Pharmacy): hosseinkhan@sums.ac.ir

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Table 1. A few Jawarish formulations from the traditional Persian medicine

Jawarish	Components	Action(s)	Preparation(s)
Amale (15)	Indian gooseberry *(Phyllanthus emblica* L.) and Sugar	Gastric tonic, Brain tonic, Liver tonic, Carminative, Appetiser	The gooseberry should be soaked in milk for 1 day. It should be boiled in water, then filtered and mixed with sugar until the highest consistency is achieved
Komooni (15)	Leaf of Common Rue (*Ruta graveolens* L.), Fruit of black piper (*Piper nigrum* L.), Rhizome of Ginger (*Zingiber officinale* Roscoe), Caraway seeds (*Carum carvi* L.) and Honey	Gastric tonic, carminative, visceral analgesic	All medicaments are to be powdered and mixed and kneaded with honey in order to get the highest consistency
Mastaki (13)	Mastic gum (*Pistacia lentiscus* L.), Sugar and Rose water (*Rosa damascene* Mill.)	Gastric tonic, decreasing salivation	The gum is to be mixed with the sugar and then dissolved in the rose oil until the semisolid form is prepared
Tamri (18)	Fruit of date palm (*Phoenix dactylifera* L.), Rhizome of Ginger (*Zingiber officinale* Roscoe), White pepper fruit (*Piper nigrum* L.), Seeds of Almond (*Prunus amygdalus* Batsch.), Leaf of Common Rue (*Ruta graveolens* L.), latex of Scammony (*Convolvulus scammonia* L.), vinegar and honey	Appetiser, treatment of dysuria, colic,	All these medicaments should be pounded except the date palm which is soaked in vinegar and pounded and filtered separately. Almond is also pounded separately and then all these ingredients should be mixed and then kneaded with honey.
Zanjabil (18)	Rhizome of Ginger (*Zingiber officinale* Roscoe), Gum Arabic (*Acacia senegal, Willd.),* Cardamom *(Elettaria cardamomum* (L.) Maton), Cloves (*Eugenia caryophyllata* Thunb.), Bark of Cinnamon (*Cinnamomum zeylanicum* L.), Fruit of Nutmeg *(Myristica fragrans* Houtt.), Anther of Saffron (*Crocus sativus* L.), Starch and sugar-candy	Carminative, digestive, stomach tonic, astringent	All the medicines are to be pounded and mixed together and then used as needed.

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The Treatment of Scrofula in Ferrara (Italy) in the 19th Century

Chiara Beatrice Vicentini[1], Lorenzo Altieri[2], Enrica Guidi[3], Carlo Contini[4], Stefano Manfredini[1,2]

[1]Department of Pharmaceutical Science, University of Ferrara; [2]Ambrosialab srl, University of Ferrara; [3]Department of Clinical and Experimental Medicine, Section of Occupational Medicine and Hygiene, University of Ferrara; [4]Department of Clinical and Experimental Medicine, Section of Infectious Diseases, University of Ferrara.

The therapeutic approaches used against scrofula in the 19th Century in Ferrara are discussed. In the manuscripts and treatises of the time treasured in the town's libraries, hygienic and dietetic rules and treatment of this illness were described. In particular, baths and mineral water spas (sulphurous, ferruginous and other mineral waters, such as a bromo-iodine-salt water) and the sea-bathing establishment were recommended.

The remedies reported in Campana's *Pharmacopoeia ferrarese* and the efficacious treatments employed in St Anna Hospital are discussed. The Committee and its President, Marquis Giovanni Manfredini, decided to cure the scrofulous in bathing establishments.

Introduction

This work represents another contribution to highlight the therapeutic approaches used in Ferrara for the typical illnesses of the 19th Century.[1]

We have chosen Campana's pharmacopoeia[2] as a good example to help us understand how the treatments, remedies and cures improved over the century. Antonio Campana (1751-1833), professor of Pharmaceutical Chemistry and Botany, wrote a successful pharmacopoeia for the apothecaries of Ferrara, that was also used both in several Italian editions and abroad from 1798 to 1851. The remedies mentioned in Campana's pharmacopoeias were also present in the literature of the time.

The remedies for tuberculosis adopted in the city were in line with those utilised in other countries. A manuscript[3] by Dr Alessandro Bennati in 1871 provides detailed and complete information about the treatments for tuberculosis used in Ferrara. In the pulmonary section there is not so much difference between remedies for tuberculosis and other diseases of the breathing apparatus, unlike what we will see later on. Lichens, cod-liver oil and opium were employed. The use of leeches and revulsives was common. Minerbi, another expert in the field, looked after tuberculosis, both professionally and for the dissemination of knowledge. In his 1887 essay *La cura della tisi da un nuovo punto di vista Argomentazioni e Proposte del dott. Cesare Minerbi*[4] he wrote about the benefits related to resting in the open air while mentioning some other remedies. 1882 was the year of the discovery of *Mycobacterium tuberculosis* by Koch. Minerbi was fascinated by the success of Koch's tuberculin. He practised this method in Ferrara, helped by a microscope, keeping the St Anna Hospital aligned with the most advanced hospitals of that time.

Continuing our work on infectious diseases in Ferrara in the 19th century[5], we here discuss the remedies and the treatments employed in Ferrara against scrofula, a particular illness related to tuberculosis, of great concern for the public health of the time (see Appendix, p. 31).

The Sources: documents and reports

The 1841 Edition of Campana's Pharmacopoeia[2], the Statistical Report[3] from St Anna Hospital, compiled by Alessandro Bennati in 1871 and 1876, and other documents and manuscripts treasured in the *Accademia delle Scienze*[6,7,16] and the *Biblioteca Ariostea* Library[20,21] of Ferrara were very helpful in guiding our research about these treatments.

The manuscripts from Accademia delle Scienze

An 1851 manuscript[6] focused on hygienic and dietetic rules: if a mother had been scrofulous, she should have turned to a compatible wet-nurse. So it was necessary to find an alternative to feed babies, but cow's milk was too different in comparison with that of humans. The pH of milk was compared with that of grazing cows and cows fed hay in the barn. Breast milk contains a higher amount of sodium, potassium and sugar. After a very detailed analysis, a correction to cow's milk was suggested to make it as similar as possible to breast milk. After six months cow's milk, or better she-ass's milk, could have been given to the babies. The manuscripts show various stages of weaning.

Accommodation had to be warm, well ventilated and sunny. The air had to be pure. Overcrowdied rooms had to be avoided, while patients should have worn clothes both warm and light. Children could go to school only at the age of 7, no longer than three hours per day and in well ventilated rooms. Physical education in winter, gardening in summer, walking and travelling were also recommended.

Hot baths and a frequent cleaning of the body were recommended each day for up to two years, then three times a week at a temperature of 28°C. Cold baths were also recommended. This bath refreshes the skin; it causes a strong reaction of the circulatory system, a strong perspiration and other benefits. Sea-bathing was more efficacious. It was suggested to immerse the body rather than spraying the water on it. Younger children had to start with a few minutes of bathing, and up to twenty minutes as they grew older. Swimming was recommended.

In another manuscript[7] (1852) kept in the *Accademia delle Scienze* Library the benefits of hydrotherapy in scrofula were praised. Mineral water (ferruginous and sulphurous water) and seawater are also rich in medicinal principles. Waters may be indicated both for external and internal use. The bath could be frozen, fresh or warm. Some physicians were advocates of the use of frozen baths. Sulphurous and ferruginous waters were recommended. *Raineriane* were mentioned as the

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sulphurous waters that emerged in Costa (Arquà Petrarca, Padua) on the Euganean Hills.[8] Archduke Rainer Joseph of Austria, a Viceroy of the Kingdom of Lombardo-Venetia, and his wife were at the S. Elena della Battaglia spa in 1827. As reported in 1830 in the *Notizie*, printed in Padua, this sulphurous mineral spring was much appreciated by the Archduke[9]. Ferruginous waters of Recoaro[10], Valdagno[11], Tartavalle[12], and Sales[13] were also recommended. It was well-known that these baths were prescribed for rickets and scrofula. These waters contained bromide and iodide salts. Tartavalle is now named Tartavalle Terme (Taceno, Lecco) and Sales is Salice Terme (Godiasco/Rivanazzano, Pavia). Medicinal properties were attributed to seawater due to the presence of sodium, magnesium, potassium chloride and iodide and bromide salts.

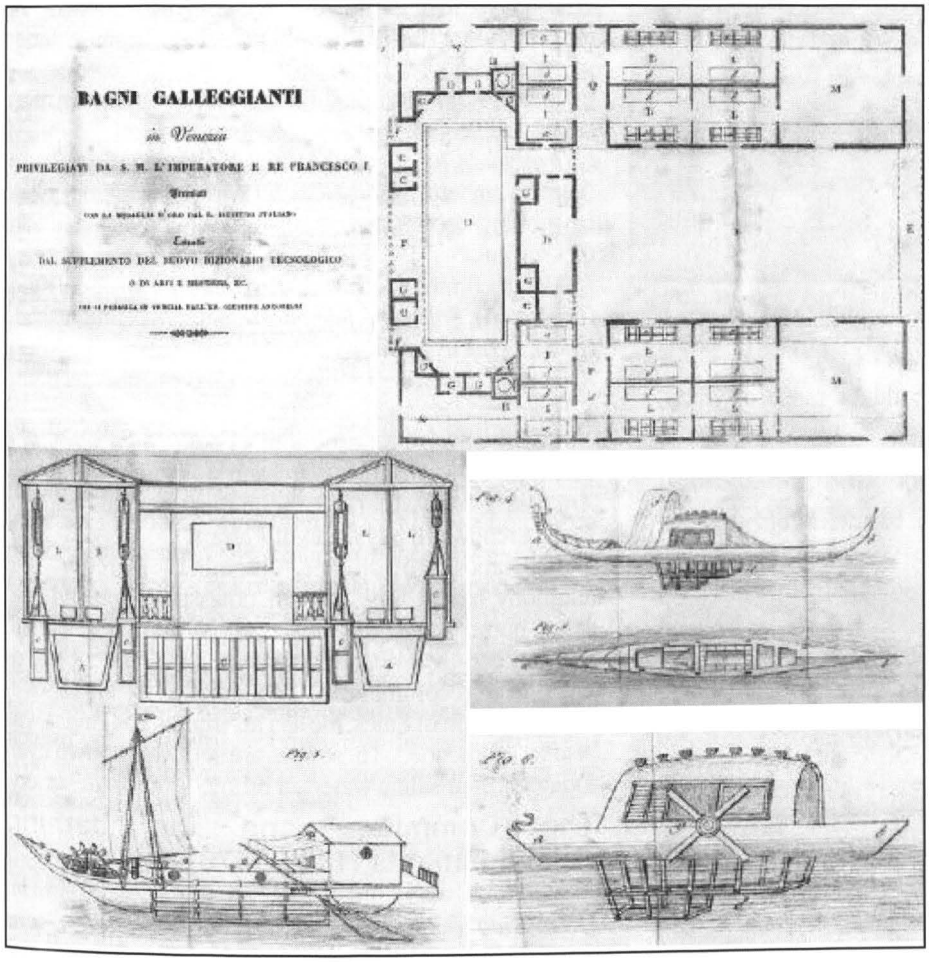

Figure 1. Venice, Floating Bathing Establishment.

A bathing establishment was built in Venice. The *Ospizi Marini per gli scrofolosi* [Marine Hospice for the Scrofulous] and the *Colonie climatiche per i fanciulli* [Children's Climatic Colony], were both helpful because of their climate. As reported by Zubiani[14], from 1856 to 1896 another 20 centres arose from Viareggio to Venice (1868), Rimini (1869), and Riccione (1871). Alpine colonies appeared in Italy in 1881 for the first time. According to Barellai[15], Viareggio started in 1856, Venezia, Isoletta del Lido in 1868, Fano in 1863, and Riccione in 1866.

Baths could be frozen, fresh or warm depending on the patients' conditions, and it could also be combined with exercises like swimming. In the manuscript[7] it is reported how Brera, Gianelli, Giacomini, Mercadante, Zumiani and Foscarini, professors of Padua, praised the thermal waters and mud baths of Euganean Hills. Zumiani and Foscarini agree that, in scrofula, baths and mud baths had to be tepid. Foscarini confirmed this in *I bagni e fanghi minerali-termali Euganei devono usarsi freddi o caldi' dubbio svolto dal dott. Giacomo Foscarini*, printed in Padua (published Crescini, 1846).

The third manuscript (1860) *Dei bagni marittimi e del modo di usarli*[16] of Giuseppe Picecco, physician in Venice (St Luca's Parish, Pesaro Palace), examines the content of minerals in seawater. It was related to the climate, more precisely to the temperature, in agreement with other cited authors. Some authors ascribe the bath's benefits to the temperature rather than to the air or to the bather's body weight action or to blasting waves. Many authors think that medicinal principles are absorbed through the skin. The temperature is not the only cause of benefit. As bathing in sea water and in river water had the same effect. Cesare Barzilai in *Guida ai bagni di mare nella laguna di Venezia*[17] underlines the importance of the amount of minerals contained. This work, printed in 1853, described observations in the Floating Bathing Establishment, in the course of the 1851-1852 bathing season in Venice. Tomaso Rima conceived this in 1833.[18] It was an Establishment moored next to S. Maria della Salute (St Mary of Health), equipped for hot and cold, fresh and salty, simple and medicated, steam baths and showers. The Establishment, 123 metres long and 17 metres wide, had 50 changing rooms. *Sirene*, gondolas with a metal cage under the keel for lady's immersion, were added in 1835 (Figure 1).

In Picecco's manuscript[16] the different kind of baths and their related benefits are discussed. The curative aim of the baths, hygienic rules and amusements are described. Baths could have been taken with shower, rain, immersion, or waves. It is important to inhale the vapours produced by breaking waves (*all'ondata*). In summer, natural baths are classified as cool. Artificial

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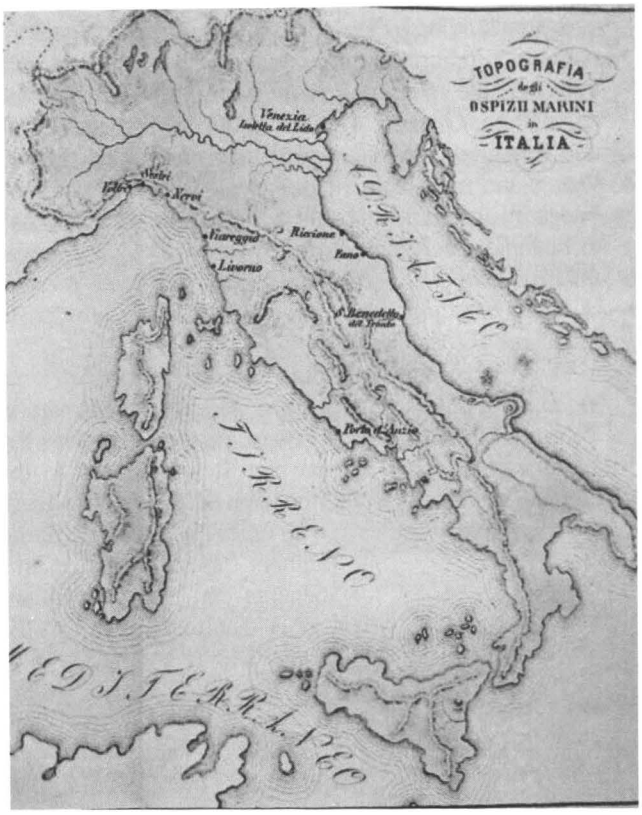

Figure 2. Italy, Bathing Establishments.

baths with warmed water in bathtubs made of wood, marble and metal were used in establishments or in houses.

Remedies against scrofula in the first two manuscripts[6,7] are given. Iodide, bromide, gold salts and mercurial and antimonial derivatives are introduced.

The Ferrarese Pharmacopoeia

Campana's pharmacopoeia[2] will help us to understand how the treatments improved over the century.

Iodine is instrumental in scrofula's treatment. Marine plants were an important source of iodine. Campana reported:

> *Fucus vesciculosus*, bladder wrack (*Varek* or *Quercia marina*) for internal use, roasted and powdered, mixed with lard; burned sponge (*Carbo spongiae*, *spugna usta)* may be applied as a poultice or administered as powder; the external use of the effective component, iodine, was recommended as frictions with potassium iodide ointment applied to glands. Caution was advised for the internal use of iodine.

Three increasing doses (for twenty days) of Lugol's Solution (*Acque minerali iodurate artificiali del dott. Lugol)* made of iodine, potassium iodide and distilled water, were administered. The external use of this solution for unhealed scrofulous ulcers is due to its rubefacient properties. *Bagni iodurati di Lugol* (baths), four increasing doses (for a month), were prescribed. A wooden bathtub was required. Tincture of iodine (made of iodine in ethanol) was also reported.

A solution of *potassium iodide* in water was preferred and it was used in the form of ointment for external application, by way of frictions to reduce scrofulous enlargements of the lymphatic glands.

Potassium bromide was believed to possess similar medicinal properties to iodide, acting as a powerful alternative, adapted to scrofulous complaints.

Lead iodide, introduced into medicine by Cottereau, was supposed to have the same properties as iodine, combined with those peculiar to lead, and hence it was used in an ointment to reduce indolent scrofulous tumours. In Paris the *Pomata crisocroma di Cottereau* made of lead iodide and lard was applied, by way of friction, to scrofulous and other indolent swellings.

Gold chloride had been used with varying degrees of success in syphilis and also in scrofula. Internally it had been administered, made into pills; but as it decomposes organic matters, as an alternative it was applied, mixed with starch and liquorice powder, by frictions to the tongue and gums. Of the gold preparations, the chloride of sodium and gold was most employed. In comparison to chloride of gold it had the advantages of being more stable and less costly.

Protiodide of mercury, *oxysulphuret of antimony* (kermes mineral), *Etiope antimoniato* or *stibiato*, made by rubbing kermes and mercury, were suggested to cure the scrofula.

Also recommended were *Tussilago farfara*, coltsfoot (decoction), *Solanum dulcamara*, bittersweet nightshade (root), *Laurus nobilis*, bay laurel (berry, powder), *Aconitum napellus*, monkshood (leaves, powder), and *Scrophularia nodosa*, figwort.

A copy of Cesare Castiglioni's book, *Della scrofola o Malattia scrofolare*[19], is treasured in the *Biblioteca Ariostea* Library. In 1863 the author sent this copy to Bosi, a renowned physician of Ferrara.

Preparations of iodine, bromine, mercury and antimony, baryta, lime, sodium, potassium, iron and gold salts, burnt sponge (*spugna usta*), animal charcoal, sulphur, cod-liver oil, hemlock, cinchona, walnut leaves were also recommended. In addition to the above-mentioned spa of Sales, the spa at Mirandolo (Pavia) was also recommended. These spas are still well-known even today for their saline waters, a bromo-iodine-salt variety.

The Committee and the bathing establishments (1867-1876)

Records of the Committees for the *Ospizi Marini* [*Resoconto degli atti compiuti dal Comitato Ospizi Marini per fanciulli scrofolosi* (1867-1874 reports)[20] and *Comitato ferrarese degli Ospizi Marini*: *Resoconto Economico-Sanitario 1876, Anno XII°*[21]] are also kept in the *Biblioteca Ariostea* Library.

In 1867 artificial sea-water was used in St. Anna Hospital, Ferrara. The Committee was unable to send the scrofulous to bathing establishments in Fano, Riccione and Viareggio because of the cholera and the war. 20 males and 25 females were hospitalised; 11 were healed, but 5 became worse.

In 1868 the Committee decided to hospitalise them in Viareggio. 24 males and 26 females were sent there. Again, 11 were healed, but 5 became worse.

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In 1869 the Committee preferred Fano to Viareggio and Venice. 28 males and 27 females were sent. 18 were healed, but a female beacame worse. In the cited manuscript[7] of 1871 is reported the intention to build an establishment in Venice. During the years 1870-1873 the male and female scrofulous patients were sent to the bathing establishment in Fano (see Table 1). In 1874 the Committee preferred Rimini to Fano and 35 males and 47 females were sent.

Table 1. Patients at Fano.

Year	Male	Female
1870	29	31
1871	30	32
1872	43	33
1873	35	47

In the 1876 report (*Comitato ferrarese degli Ospizi Marini: Resoconto Economico-Sanitario 1876, Anno XII°*)[21] it is reported that 33 females and 36 males were sent to the bathing establishments in Rimini. At the health check on their return in February, 15 came back completely healed, 6 suffered from other diseases, 2 were stable and 3 died. Minerbi wrote[4] that, as shown in the Committee's reports, 243 scrofulous patients were sent to the bathing establishment in the years 1879-1882; 128 were healed and 83 improved.

Remedies

In the 1867 document, remedies employed in St Anna Hospital were also reported (Table 2, opposite). Some remedies correspond to what we described[1] in the tuberculosis treatments. Ointment of potassium iodide was applied, by way of friction, to the foot. Campana recommended the external use of iodine salts. For impetigo, lotions made of *Jacea* decoction were prescribed. In the 1841 edition of the *Pharmacopoeia ferrarese*[2], Jacea or Erba trinitas (*Viola tricolor*) was reported as helpful in skin illnesses and cradle caps.

In the documents of 1872 and 1873, remedies used in Fano's Establishment were also reported (Table 3, below). Ulcers were treated with nitrate of lead and tincture of iodine, applied with a camel-hair brush. Eye diseases were treated with glycerin and tannin and otorhinolaryngo-diseases with *doccetta del Weber* (Weber's spray).

Table 3. Treatment prescribed at Fano's Bathing Establishment (1872, 1873)[20]

Remedies	1872*	1873*
Lead nitrate (powder)	17	0
Tincture of iodine	12	10
Unzione con olio fosforato	1	0
Glycerin and tannin	12	6
Doccetta del Weber	3	2
Collodion	0	1

* Number of times the remedy was mentioned

Table 2. Treatments prescribed at St Anna Hospital (1867)[20]

Preparations	*
Cod-liver oil	8
Ointment of cod-liver oil	1
Ferruginous cod-liver oil	3
Ointment of potassium iodide,A1 friction to the foot	1
Iodide of iron (Reali's Syrup of Iodide of Iron)	2
Iron (iron carbonate)	2
Iron bicarbonate	1
Iron (powder)	1
Tonics and iron (Iceland moss, cinchona and pills of iron carbonate)	1
Jacea decoction (lotion healing impetigo)	1
Iron lactate	1
Iceland moss and milk	1
Barium chloride, iron bicarbonate, manganese oxide	1
Revulsives	1
Common phosphate of iron, phosphate of lime	1
Collyrium	1

* Number of times the remedy had been mentioned.

Alessandro Bennati's Reports of the St Anna Hospital (1871, 1876)

Alessandro Bennati's Report of the St Anna Hospital[3] showed that there were 29 cases of young patients affected with scrofula in 1871. In the Medical Division benefits were obtained in two cases by the renowned *Acque salsoiodiche* of Castrocaro[22], a salty water with a bromo-iodine-salt content. One was healed, while the other continued treatment at home. In the Female Department a fourteen-year-old girl was treated with ferruginous cod-liver oil. She was discharged after 8 days to continue her treatment at home. A sixteen-year-old girl, ill since she was seven, was cured with the same remedy and decided to leave the hospital after 15 days.

In the Surgical Division 15 people (8 males and 7 females) had been hospitalised and 3 of them died. Their age was between 6 and 23. In eight cases of this illness (not yet in an advanced state) patients left the hospital after 15-70 days, and 1 male and 1 female were sent to the bathing establishments in Fano.

Ulcers were cauterised with *Pietra infernale* (dry silver nitrate), treated with *Acqua vegetominerale* (made of lead acetate and lead oxide) and haemostatic *Acqua del Pagliari*.

Bayuton's adhesive plasters, *filaccia* or *faldelle/plumaceaux* (messy or ship-shaped cotton threads) dry or with ointment (made either with cod-liver oil or extracts of walnut leaves) or soaked in vinegar, as well as

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poultices, linseed poultices and *Empiastri di linosa* (poultices made of seawater) were used. Tincture of iodine was applied with a camel-hair brush. Internal treatments were made with cod-liver oil and iron compounds (iron carbonate, iron hydrocyanate, and *Tintura di Marte pomata* made of iron and apple juice), cinchona (decoction, syrup, tincture), quinine sulfate, quinine arsenite and pills of quinine tannate and opium . *Acque salsoiodiche* of Castrocaro were prescribed for internal and external use.

Cinchona and salts of quinine were employed as a cure for fevers. Only in one case, an enema with decoction of rice, yolk and laudanum; *limonee* iced acid solution; quinine tannate and opium pills were necessary to stop excessive diarrhoea.

In the Surgical Division, 5 other scrofulous patients (2 males and 3 females), also affected by eye diseases (conjunctivitis and keratitis), were hospitalised. Treatments were made with cool water rinses to the eyes, collyrium (silver nitrate), cod-liver oil, and enemata. In addition, 5 scrofulous patients (1 male and 4 females) affected by adenitis and lymphatic obstructions (*ingorghi linfatici)* had been hospitalised. Treatments were made with *Acque salsoiodiche di Castrocaro*, tincture of iodine (applied with a camel-hair brush), baths, linseed poultices and cod-liver oil. The patients left the hospital after 14-47 days. The remedies are summarised in Table 4.

At the Dispensary 24 out-patients were cured. In the Report a chapter is entirely devoted to bathing treatment. St Anna Hospital had an elegant establishment for in- and out-patients. Among 183 saline baths for scrofulous patients, 118 were intended for out-patients.

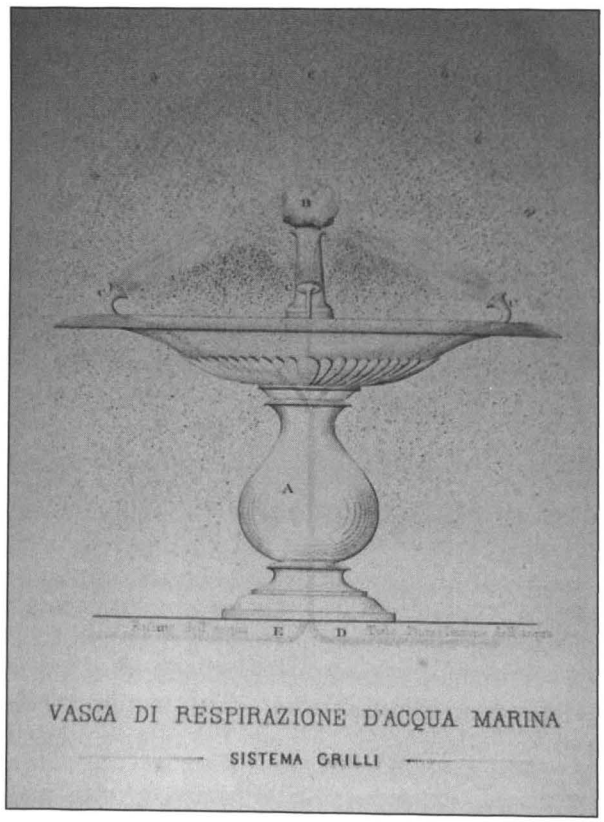

Figure 3. *Vasca di respirazione d'acqua marina.*[23] The sea environment was recreated by a fountain surrounded by seaweed, where patients could inhale the vapours produced by the 'breaking waves' that were generated by the impact of the seawater with a stone positioned in the middle.

Table 4. Treatments prescribed at St Anna Hospital

Preparations	*
Cod-liver oil	10
Ferruginous cod-liver oil	3
Iodide of iron (pills)	1
Iron carbonate (powder)	1
Iron (powder)	2
Hydrocyanate of iron	1
Tintura di Marte pomata	1
Cauterisation	4
Pietra infernale (silver nitrate cauterisation)	1
Acqua del Pagliari, diluted phenol solution (injection)	1
Acqua vegetominerale	1
Bayuton's adhesive plaster	2
Filaccia/Faldelle (dry)	7
Filaccia (vinegar-drenched)	1
Filaccia (with ointment)	2
Filaccia/Faldelle with ointment made with walnut leaf extracts	2
Faldelle (with cod-liver oil ointment)	1
Poultices	3
Linseed poultices	2
Empiastri di linosa (poultices made of seawater)	1
Unguento rosso	1
Tincture of iodine	3
Cinchona (decoction)	4
Cinchona (syrup)	1
Cinchona (tincture)	1
Quinine sulfate (pills)	3
Quinine arsenite	2
Quinine tannate and opium (pills)	1
Iced *Limonee*	1
Enema	2
Acque salsoiodiche of Castrocaro	4
Cool water rinse	3
Collyrium (silver nitrate)	4
Baths	1

* Number of times the remedy was mentioned

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As reported at St. Anna Hospital in the Medical and Surgical Divisions in a concise report (*Rendiconto sanitario dell'anno 1876 redatto dal M. Alessandro* Bennati),[3] iron, cinchona, lichens, cod-liver oil, ferruginous cod-liver oil, *Acqua salsoiodica di Castrocaro*, potassium iodide, baths, *Empiastri di linosa*, potassium iodide ointments, *filaccia* and phenol solution were prescribed. While 13 scrofulous patients were hospitalised in the Medical Division, and 12 (ulcer) and 25 (adenitis) in the Surgical Division, 123 were treated at home.

In conclusion we can say that there were very few effective remedies against tuberculosis in the 19th century. Nevertheless physicians tenaciously fought against scrofula, often with success.

Appendix

Scrofula is a tuberculous infection of the skin of the neck, most often caused in adults by mycobacteria (including *Mycobacterium tuberculosis*). In children, it is usually caused by *Mycobacterium scrofulaceum* or *Mycobacterium avium*.

In the Middle Ages it was believed that scrofula, could be cured by the 'royal touch', the touch of the sovereign of England or France. Scrofula was therefore also known as the King's Evil. The kings were believed to have received this power by descent from Edward the Confessor, who, according to some legends, received it from Saint Remigius.

From 1633, the Book of Common Prayer of the Anglican Church contained a ceremony for this, and it was traditional for the monarch (king or queen) to present to the touched person a coin – usually an Angel, a gold coin the value of which varied from about 6 shillings to about 10 shillings [. The superstition that maladies can be cured by royal touch is dead, but it has left a monument of custom to keep its memory alive.

Corresponding Author: Stefano Manfredini, Department of Pharmaceutical Sciences, University of Ferrara, via Fossato di Mortara 17/19, 44121 Ferrara, Italy; Phone: +390532455292, Fax: +390532455378; E-mail: mv9@unife.it

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Medical supplies for the expeditions of the heroic age of Antarctic exploration: introduction

Dr HR Guly FRCP, FCEM

Retired consultant in emergency medicine, Derriford Hospital, Plymouth, PL6 8DH

During the heroic age of Antarctic exploration (1895-1922) there were at least 18 expeditions to the Antarctic lasting between 18 and 30 months. This is an introduction to a series of articles about the drugs taken and used in the Antarctic at this time. Most of the information relates to the expeditions of Robert Scott and Ernest Shackleton and the main supplier of medical equipment was Burroughs Wellcome and Co. This article also describes the medical cases that were taken to the Antarctic.

Introduction

The start of the heroic age of Antarctic exploration is generally agreed as 1895 when the International Geographical Congress resolved:

> that the exploration of the Antarctic Regions is the greatest piece of geographical exploration still to be undertaken ...'[1]

Polar historians debate when the heroic age ended but I have defined this as the end of Ernest Shackleton's final (*Quest*) expedition in 1922. Although this era is best remembered for the exploits of Amundsen, Scott and Shackleton in trying to reach the South Pole, there were at least 18 expeditions to the Antarctic during this time. These are still of historical interest and new books are still being written about them. In a series of articles I will explore the drugs and other medical supplies taken, with the aim of helping the understanding of these expeditions and throwing light onto the therapeutics of that era. Although many aspects of medicine in early Antarctic exploration are unique, there are obviously links with medicine at sea, military medicine, medicine in the whaling industry and medicine on other types of expeditions.

This was, of course, a time of great developments in pharmacology: for example the following changes occurred during this era:[2]

1899	Aspirin introduced
1900	Caffeine synthesised
1900	Benzocaine synthesised
1902	Theophylline advocated as diuretic
1902	Adrenaline (epinephrine) purified
1903	Veronal (barbitone) introduced (1st barbiturate hypnotic)
1904	Adrenaline synthesised

Thus there were changes in the drugs taken over this period. For example Dr Edward Atkinson on the *Terra Nova* expedition (1910-3) discusses the value of adrenaline eye-drops whereas they had not been mentioned in earlier expeditions.

Most of the drugs for the British and the Australian expeditions were supplied by Burroughs Wellcome and Co (BW&Co) who also supplied some equipment to Amundsen's *Fram* expedition (1910-2). The best information concerns the drugs for Scott's *Discovery* and *Terra Nova* expeditions and Shackleton's Imperial Trans Antarctic Expedition (ITAE), with incomplete information about his *Nimrod* expedition.

Discovery expedition 1901-4

The aim of this expedition was twofold. There was a major scientific programme but Scott also hoped to reach the South Pole. I have not found a list of the drugs supplied to the *Discovery* dating from this expedition. However in 1910, when Dr Edward Wilson was selecting the medical supplies for the *Terra Nova* expedition, BW&Co sent him a list of the drugs supplied by them to the *Discovery*, for his guidance.[3] Dr Reginald Koettlitz, the senior surgeon to the expedition, said that although the main medical outfit was supplied by BW&Co, 'In addition I took a few of Oppenheimer's Palatinoids, which also proved thoroughly successful.'[4] He is quoted, in a testimonial, as saying to the company 'we have many of your products on board which have not been used' and offering to sell them back but warned that 'they would require cases or hampers to pack them in before being taken away.'[5] This sounds like more than 'a few'.

Palatinoids consisted of 'two convex disks of soluble jujube containing the purest drugs obtainable of powder

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or liquid, without the addition of excipient unless the local effect of the medicament would be either corrosive or extremely poisonous. Palatinoids are easily swallowed, accurate in dosage and keep indefinitely. All drugs usually taken as powders, pills or cachets are supplied in this portable and elegant form.'[6] I have no record of what drugs he took in this form.

Terra Nova expedition 1910-3

Like the *Discovery* expedition, there was a large scientific programme but Scott also reached the South Pole and, as is well known, died on the return journey. In addition to the main expedition, a smaller group, the Northern Party, had to spend a winter in a snow cave when the ship was unable to relieve them. There are two lists of drugs taken on this expedition. Dr Edward Atkinson published a list in the expedition reports[7] and BW&Co have a list of the drugs they supplied.[8] These are almost identical (apart from a few typographical errors). The differences are discussed below. However, both lists are incomplete as they later ordered 3 doz × 100 'Tabloid' Thyroid Gland gr. 5 [and] 3 doz × 25 'Tabloid' Carlsbad Salt Eff[ervescent].[9] In addition Dr Murray Levick also wrote:

> Could you supply a few of Martindales Trilactine Tablets I find they work well with Nestles milk and I think they might be of much value to us[10]

and he ordered some additional dental equipment[10] I have described the dental equipment taken, elsewhere.[11]

Imperial Trans-Antarctic Expedition (*Endurance* and Ross Sea Party) 1914-7

In this expedition, Shackleton intended to sail to the Antarctic in the *Endurance* via the Weddell Sea and to land a party who would build a hut for the winter. The following spring a small party would make a sledge journey to cross the continent via the Antarctic plateau and South Pole to the Ross Sea. Another group (the Ross Sea Party) sailed to the Ross Sea in the *Aurora* to set up depots of food and fuel between the Ross Sea and the South Pole for Shackleton to use on the second half of his journey. (In the event, the *Endurance* became trapped in ice and never reached the continent.) A list of the medical equipment supplied to for this expedition is in the Wellcome archives.[12]

Nimrod expedition (1907-9)

This expedition was an attempt to reach the South Pole and got to within 97 miles of it. However another group successfully reached the magnetic South Pole. Information on this expedition is less complete but the New Zealand Antarctic Heritage Trust have produced a list of the equipment that Shackleton took with him based on articles mentioned in books about the expedition and artefacts found in his hut.[13] This list is therefore likely to be incomplete. However where a particular drug is recorded as having been taken on the other expeditions but not the *Nimrod*, it is likely that it was, in fact, taken but that there is no record of this.

In addition to drugs supplied by BW&Co, artefacts found in the huts include drugs not on the lists and/or not supplied by BW&Co. Some of these are shown in Table 1. Some may have been brought as personal items by expedition members and some supplies were obtained in Australia and New Zealand. In 1958 a bottle of mercuric chloride, sodium chloride and sodium sulphide was found in an Antarctic hut, with a label from G. Bonnington, a Christchurch pharmacist. This was returned to the pharmacy and was identified as having been supplied to the *Nimrod* expedition in January 1908.[14]

Another Christchurch pharmacy supplied chemicals to the *Morning* (a relief ship to the *Discovery* expedition) in 1902 and also a stomach tube for a total of nine shillings and sixpence (47.5 p).[15]

Table 1. Medically-related items found at bases but not supplied by Burroughs Wellcome

(With thanks to New Zealand Antarctic Heritage Trust)

Object	System ID	Accession No.
Cape Evans		
Bottle of iodine crystals. Hopkin & Williams Ltd	2362	AHT 3096.1
Bottle of unknown substance with label: label 'Not to be taken, Richton Chemist, 293 Lord St and 48 Houghton St, Southport'	2356	E/F/90
Bottle containing unidentified white crystals with label: 'POISON. HARROD'S Ltd. Dispensing Dept., Brompton Road, S.W. Wood and Cork stopper reads HARRODS Ltd. DRUG DEPT. LONDON S.W.'	2175	E/F/51
Bottle containing unidentified tablets. Bottle embossed on base 'FB & F. NEW YORK'	1777	E/F/110.1-2
Packet labelled 'EUCRYL TOOTH POWDER Fragrant. Antiseptic. Cleansing.'	2282	E/F/620
Cape Royds		
3 bottles marked 'pure medicinal cod liver oil'.	5867, 5868, 3759	AHT1088.1, AHT 1088.2, AHT 1088
Bottle with label reading 'Effervescent sodii phos co c Lithia. 'DUNCAN, FLOCKHART CO., EDINBURGH LONDON' Hand written in pencil are the words 'Enos Fruit Salt'	3769	R/F/144
Bottle with label 'IZAL.' A multi-purpose medicine and cleaner.'	702	R/F/1

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Other expeditions

There is very little information concerning the other expeditions. The *Southern Cross* (1898-1900), the Scottish (1902-4), the Australian (1911-14) and the *Quest* (1921-2) expeditions were all supplied with drugs by BW&Co and so their supplies are likely to be very similar. Amundsen (1910-12) was supplied partly by BW&Co and partly by a Norwegian pharmacy. The Australian expedition and the *Southern Cross* expedition would have undoubtedly obtained some drugs from Australia.

The supplies of the French expeditions are likely to be based on the requirements for ships issued by the Ministre de la Marine et des Colonies, and recently described in a doctoral thesis.[16]

The first German expedition (1901-3) followed Naval and merchant marine regulations (and so, presumably, did the second German expedition, 1911-3) and their drugs were supplied by the Oranien Pharmacy, Berlin.[17] I have no details of the Japanese expedition (1910-2).

I have also sought to find out how the drugs were used from articles written by doctors after the expedition, from books of the expeditions and diaries, published and unpublished. Much of this information is incomplete and it is very frustrating to read that an abscess was incised without any details about anaesthesia; that a fracture was treated with no mention of analgesia and other symptoms mentioned with no description of how they were treated. The only complete medical records I have found are the diaries of William Spiers Bruce a medical student who acted as surgeon on the Dundee Whaling Expedition to the Antarctic in 1892-3, ie before this period. I have described elsewhere the medicines taken and used on that expedition.[18]

Selection of drugs and equipment

The expeditions lasted between 18 and 30 months. Selection of drugs and quantities to be taken was (and for modern expeditions, still is) a balance between cost, weight and bulk on the one hand and a need to cope with every eventuality on the other. Many of the expeditions talk about drugs hardly being used and Koettlitz in a letter implied that large quantities of unused drugs remained on return.[5] Atkinson in his report said

> The only thing that can be said is against the amount of the outfit and the quantities supplied, against this however can always be argued the possibilities of events arising where the various units of the Expedition might be unavoidably be detained in the Antarctic for long periods. The Antarctic is however a part of the globe where mercifully one does not need a great deal of medicine but it is as well to remember that this cannot be judged beforehand and that any eventuality must be provided against.[19]

Drugs carried on board ships

For the British expeditions, the choice of drugs and equipment was not entirely at the discretion of the doctors. The Merchant Shipping Act 1894 (and previous Acts) stated that 'the Board of Trade shall issue scales of medicines and medical stores suitable for different classes of ships ... and shall ... sanction books containing instructions for dispensing the same.'[20] Quantities to be taken varied depending on the number of people on board the ship and the duration of the voyage.

A list of drugs for merchant ships without a doctor is reproduced in *The Ship Captain's Medical Guide* of 1901.[21] This is of relevance as some ships sailed without a doctor (eg the *Aurora* for the Ross Sea Party, the *Terra Nova* after it dropped the shore party.) This (and other books for the use of ships' officers)[22] give details of how the drugs should be used in a way that is often absent in medical texts as it was assumed that doctors would know. A list of drugs for ships carrying passengers and a doctor has been given in a handbook for ships' surgeons.[23] Not surprisingly the drugs and equipment on the expeditions greatly exceeded those laid down by the Board of Trade though some of the drugs on the Board of Trade list do not appear to have been carried on the exploring ships.

Alcohol

In addition to the drugs listed, alcohol, especially in the form of brandy, was also regarded as a drug. I have discussed the use of this elsewhere.[24]

Medical comforts

A further treatment option was 'medical comforts'. These were foods for invalids and convalescents and also for the prevention and treatment of illness. This included alcoholic drinks, beef extracts and milk extracts. These, too, are discussed elsewhere.[25]

Burroughs Wellcome Medicine Chests

BW&Co also sold cases of medical equipment to doctors, first aiders and others and they had a range of standard cases described in their advertising literature. Others have described BW&Co's medical cases from a cultural perspective.[26, 27]

The main chest was their number 250 chest (Figures 1 and 2), which was based on that supplied to Stanley in his explorations of Africa and so often called the 'Congo case'. It was described as the standard case for large expeditions and was supplied to the military, missionaries and others. It contained six 5-oz and thirty 3½-oz bottles of Tabloid and Soloid drugs and chemicals, as well as instruments, dressings etc. It was made of sheet steel and, when full, weighed about 40 lb (18.1 kg).[27] The contents are different for the *Terra Nova* and ITAE expeditions. These will be described under the headings of oral drugs, injections, etc.

The no. 251 chest was a lighter version of the no. 250, made of aluminium and containing forty 3½-oz bottles of drugs. Otherwise it was the same as the no. 250.[28]

The no. 254 medicine chest (also called the 'Indian') contained 1sixteen 1¾ oz glass-stoppered bottles and six 4-drachm phials of Tabloid and Soloid products together with instruments, dressings etc. It weighed about 12 lb (5.4 kg).[29] and was designed to be the personal medical chest for missionaries and others. Like the no. 250 and 251 cases, its contents were not standard.

Pictures of the 250 and 254 cases are shown in Figures 1, 2 and 3.

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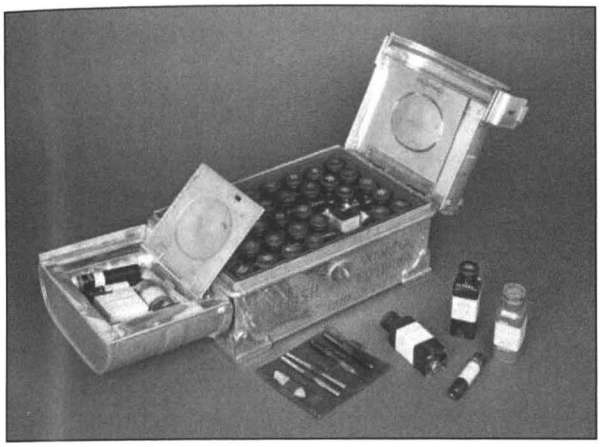

Figure 1. Burroughs Wellcome No. 250 medicine chest. Printed by kind permission of the Science Museum.

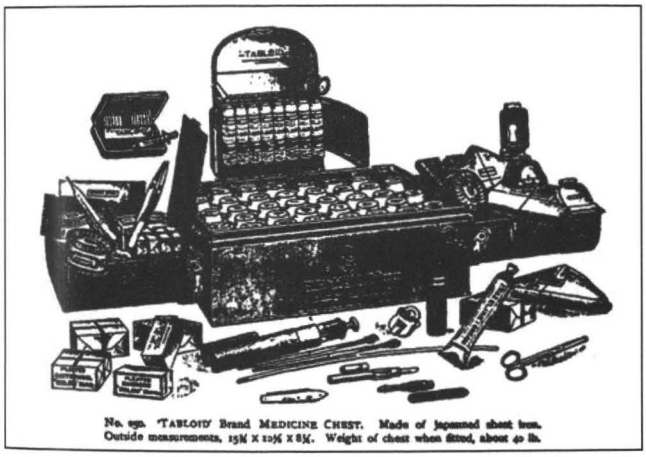

Figure 2. Burroughs Wellcome No. 250 medicine chest and contents. From Advertisement in Royal Geographical Society. *Hints to Travellers Scientific and General: volume 2*. London: RGS, 1906: vii

Discovery

The *Discovery* expedition took:[3]

- No 251 medical chests. The contents were not described but were probably similar to the contents on later expeditions.
- 2 No. 254 medical cases. The contents were not described.
- (Unreadable number) of 137 medical cases. This was, presumably their sledging case and will be discussed later in the series.
- 2 Ophthalmic cases. Ophthalmic drugs will be discussed later in the series.
- No. 7 hypodermic case.
- Additional drugs and equipment.

Terra Nova expedition

Atkinson says:

> The lists and constituents were finally selected by Dr E A Wilson working with Mr J Dowdeswell the manager of Messrs Burroughs & Wellcome Co and the ultimate result was a great credit to these two ...'[19]

The equipment consisted of:[8]

- No. 251 aluminium 'Tabloid' 'Congo' medical chest. This contained a No. 91 'Tabloid' ophthalmic case and a 'No. 7 Tabloid hypodermic case'. This was the main medical chest used in the hut and on the ship.
- 2 No. 254 'Tabloid' medical cases
- 12 sledge cases,
- Surgical instruments (on loan)
- Additional supplies

BW&Co say that two Tabloid No 254 medical cases were sent and describes their drug contents. Atkinson does not mention these but says that they took two No 254 cases 'fitted with an assortment of Tabloid photographic products'.[7] BW&Co did supply the photographic materials for the expedition and say that they supplied 'No. 254 'Tabloid' photographic cases'[8] but this was in addition to the No 254 medical cases. I have found no other description of a No. 254 photographic case (except as supplied to the ITAE)[12] and presume that the photographic chemicals and papers were packed into a 254 medical case for convenience.

The published list describes a No. 10 hypodermic case whereas the supply list describes a No. 32 hypodermic case. However both contain five tubes of tabloid products and their contents are identical.

Imperial Trans-Antarctic Expedition

The equipment supplied[12] was divided into:

- Drugs and equipment for the ship
- Drugs and equipment for the Weddell Sea Party. This consisted of
  - No. 250 'Tabloid' medical chest which also contained
    - No 90 'Tabloid' ophthalmic case.
    - No 7 'Tabloid hypodermic case'
  - Additional supplies
- Drugs and equipment for the plateau sledge
  - Special No. 254 'Tabloid' medical case which contained
    - No. 90 ophthalmic case

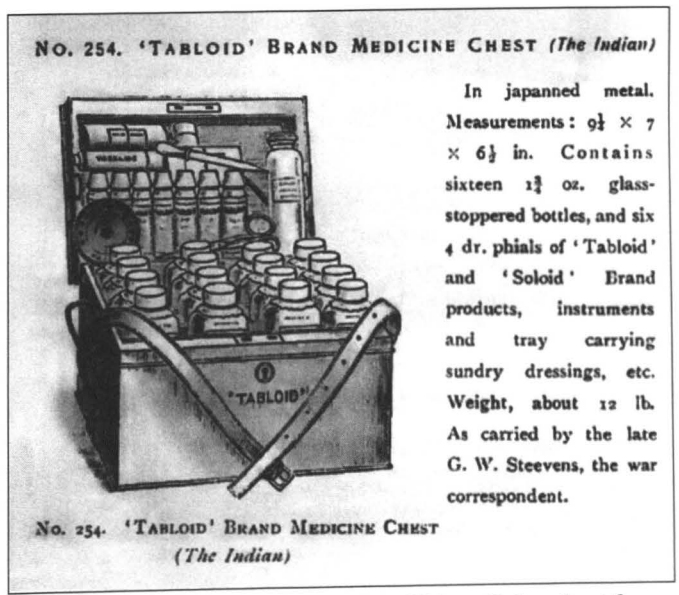

Figure 3. Burroughs Wellcome No. 254 medicine chest from Anon. *The Evolution of Antiseptic Surgery*. London: Burroughs Wellcome & Co, 1910: 133.

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- Hypodermic products
- 2 canvas sledging cases,
- Drugs and equipment for the Ross Sea Party
- Drugs and equipment for the *Aurora.*

Nimrod expedition

A photograph of one of the expedition medical chests[30] shows this, quite clearly, to be a BW&Co No. 250 or 251.

In addition to the medications and photographic equipment as mentioned, BW&Co also supplied chemicals for Dr Atkinson's bacteriology, protozoology and helminthology and, for the Australian expedition, a box of medicines for the dogs.[31]

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Author's address: The Shrubbery, Bedford Rd, Horrabridge, Yelverton, Devon, PL20 7QH
hguly@aol.com

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Beyond the Better-known Herbals

Julie Wakefield
St Albans, Hertfordshire

For the historian researching historic herbalism there is a wealth of sources in the form of herbals. The most well-known of these were written by Willam Turner, John Gerard, John Parkinson and Nicholas Culpeper in the 16th and 17th centuries.[1] Other frequently consulted sources from the same period are William Coles *The Art of Simpling*, the writings of Pechey and Salmon, and manuscript receipt books compiled by gentlewomen.[2] However, there are other sources from the 1600s which are overlooked or unknown to many working in this area. Likewise there are a variety of sources from the centuries which followed this 'golden age' of herbalism which can be mined by historians of plant-based medicines. A few of these will be looked at here, with examples of the sort of information they can yield. The first three of these sources were written by authors who (like Culpeper) had a deep interest in the esoteric and the occult.[3]

Samuel Strangehopes' *Book of Knowledge* (1663)

This is comprised of three books. Book I is entitled 'Brief Introduction to Astrology', Book II 'A Treatise on Physick or Every Ones Companion', and Book III 'The Countryman's Guide to Good Husbandry'.

This is a very interesting source in that it includes both recipes you would typically find in a 17th century receipt book and also far more basic remedies. Examples of its receipt book-type contents are found in the section headed 'Certain Rare Receipts to make Cordial-Waters, & Conserves, & Preserves, for every Lingering Sicknesses, or Consumption'.[4] These were certainly most suitable for the wealthier classes of readers, which would include the women who compiled handwritten collections of culinary and medicinal recipes, as many of these receipts call for a large number of ingredients, some highly costly. One recipe includes coral & pearl.[5] The woman making these cordial-waters, conserves and preserves might also need to own equipment not found in humbler homes, such as an alembic. The instructions for making syrup of violets include standing the ingredients for 12 hours in a silver tankard.[6] However, within the same book are the most basic remedies which could be utilised by readers of the lowest status. The recommended treatment for a nose-bleed is simply to insert comfrey into the nostril. To staunch a blood-flow caused by injury, 'Lay hogs-dung, hot from the hog, to the bleeding wound'.[7]

The works of Joseph Blagrave

Blagrave is a fascinating character today variously described as a country doctor, herbalist and astrologer. He described himself as a student of physic and astrology. Was Blagrave also a gentleman cunning-man? Cunning-men specialised in un-bewitching, the removal of a spell a witch had cast on a person or animal, and Blagrave took pride in his proficiency in this, as is clear from his book *Blagrave's Astrological Practice of Physick* (1671). Within this is an account of his reversal of a bewitching which had rendered a boy mute.[8] He also describes how to effect cures by means of magic. For example, part of the ritual to restore a wasted limb is to seal the nail clippings, hair and skin scrapings of the patient in a hole bored in a willow tree. At a precise astrological moment.[9] There is also a section detailing how to use astrology to judge thefts (another area in which cunning-folk specialised). Turning to his section on herbalism, this includes directions for making various preparations. Within this section Blagrave also describes methods for remedy-making not described by Culpeper, such as how to make diet-drinks, glysters, fumes and suffumigations.These include methods for making diet-drinks, glysters, fumes and suffumigations.[10]

The book's 'Catalogue of herbs' isn't arranged by chapters on individual herbs, as in conventional herbals. Instead it is arranged by condition and lists the herbs that can be used to treat these, taken in any form. For example, 'Broken bone to help knit: bugle, elm-peel, butchers broom, holly, mastick tree, self-heal, solomon's seal, yarrow'.[11] In some instances, researchers may find this a more useful arrangement.

Blagrave's Supplement to Culpeper (1674)

The Wellcome Library's copy of *Blagrave's Supplement* (1674 edition) is bound with Culpeper's *English Physitian Enlarged* (1695 edition) to form a single volume. Blagrave chose the octavo format for his Supplement precisely so that it could be bound with Culpeper's herbal. He states that his book is a supplement in that it includes plants that grow in England, and imported drugs sold by druggists and apothecaries, which are omitted by Culpeper. He also includes chapters on plants that are found in Culpeper's herbal, claiming that he supplies 'Additional Virtues of such plants wherein he [Culpeper] is defective.'

The usefulness of this source can be seen by comparing the two authors' treatment of elder. Blagrave's description of the Virtues of Elder dwarfs that of Culpeper's, running to 11 pages.[12] Within this he gives every one of the virtues given by Culpeper, in the same or near identical wording. Intermingled with these are a great many of his own. He also includes additional details such as when to administer the medicine. For example, distilled water of elder to treat dropsy should be taken two hours before supper. Unlike Culpeper, within the virtues he gives 'particular, and late experienced medicaments' for 14 conditions such as pain in the head, falling sickness, defects of nose and smelling. And again he goes beyond Culpeper in the amount of detail in his instructions for making and administering remedies.

> For continual hot burning fevers: Take of fountain or river-water 3 pounds, of Elder vinegar 3 ounces, of the finest sugar 2 ounces. Let them boyl together a little in a fit vessel; unto which being warm, add an ounce of cinnamon powder, let them cool themselves in a close vessel, and strain them for a Julap, of which give the patient oft in a day.[13]

A Key to Physic and the Occult Sciences, Ebenezer Sibly (1794)

This initially might seem an unlikely source for research into historic herbalism. Its subtitle begins '*Opening to mental view, the system and order of the interior & exterior heavens, the analogy betwixt angels and the spirits of men; and the sympathy between celestial and terrestrial bodies ...*' It continues '*from where is deduced ... the*

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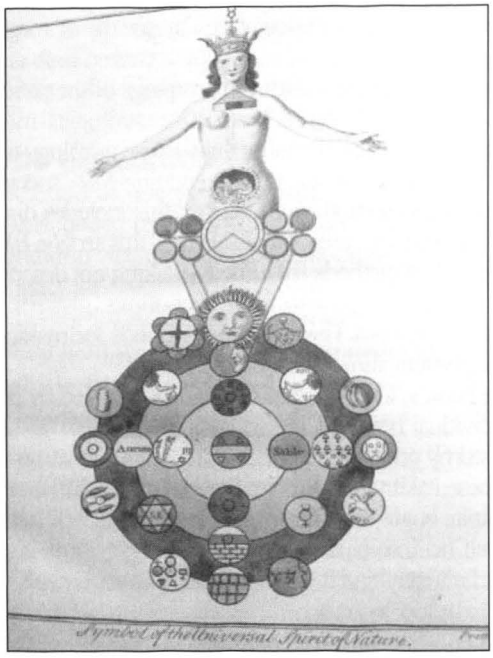

Figure 1. 'Symbol of the Universal Spirit of Nature', from E Sibley. *A Key toPhysic and the Occult Sciences*, 1794. Wellcome Library

fundamental causes ... visible or occult, of all diseases.' However, the section on physic is surprisingly down to earth. The discussions of treatments for various conditions are lengthy and erudite.

The section on 'dropsy of the breast' informs us that *Digitalis purpurea* (foxglove) was frequently used to treat this type of dropsy. He cites the work of William Withering and warns that digitalis must be given with great caution, and in small doses, as it slows the pulse and can cause severe vomiting. However, he continues, there is no doubt that it is a very effective diuretic, producing complete evacuation of water when other remedies have failed. Finally his directions for the application of digitalis are precise.

> A dram of the dried leaves of the digitalis, macerated for 4 hours in half a pint of warm water, forms an infusion which may be given in doses of an ounce, and the dried powder of the leaves in doses of one or two grains; these doses may be gradually increased, and repeated twice or oftener in the day, but this requires to be done with great caution.[14]

The next two sources are of a type more typically consulted by researchers.

'Sheldrake's Herbal' (1759)

This volume is commonly referred to as Sheldrake's Herbal because it is illustrated with copper plates taken from drawings by T. Sheldrake. Its true title is *Botanicum Medicinale or Herbal of Medicinal Plants on the College of Physicians List*. The list referred to gave the plants recommended for use in the 'official' preparations and recipes in the pharmacopoeias of the College of Physicians. Each page is decoratively set out. A colour illustration of a plant, within a central roundel, is surrounded by its 'Names', 'Parts Used', 'Place' (for example, 'ditches & watery places'), 'Time' (of flowering). At the bottom of the page, beneath a paragraph of 'Description', come the 'Virtues'. Compared with most herbals the descriptions of the virtues are very brief. On the page devoted to 'Clowns All-Heal' (hedge woundwort) this section comprises just one sentence: 'This Herb beaten into a Cataplasm with Hogs Lard is accounted good to heal fresh wounds.'[15] Precisely because the virtues recorded were so few, Sheldrake's herbal can be regarded as a thing of beauty rather than usefulness. However, the very fact that it is so brief can actually make it more useful to the researcher than herbals which give long lists of virtues. If only one is given, in this case that it can be used as a cataplasm for wounds, then this is a strong indication of the main way in which this plant was historically used.

Medical Botany, John Stephenson & James Morss Churchill (1831)

By the early 19th century the herbal had evolved into works such as the three-volume publication, subtitled *Illustrations and Descriptions of the Medicinal Plants of the London, Edinburgh, & Dublin Pharmacopoeias including a popular and scientific account of Poisonous Vegetables indigenous to Great Britain.* This publication is in appearance and content very different from Sheldrake, although its subtitle reveals that it too comprises illustrations and descriptions of plants recommended by the College of Physicians. Both books are beautifully illustrated but, in complete contrast to Sheldrake, the entries for the plants within *Medical Botany* are highly detailed. The section on 'medicinal properties and uses' within the chapter on *Atropa Belladonna* (deadly nightshade) runs to three pages and includes case studies.[16] The chapter on spike lavender reveals that in the early 19th century it was cultivated in the vicinity of London, Mitcham in Surrey and Henley-on-Thames. Also that the flowers, being gathered in June, were dried in the shade and 'put up in bundles for sale'. Under 'medical properties and uses' we are told that its essential oil was valued as a stimulant, that spirit of lavender 'forms a useful cordial for the nervous of the fair sex', that the dried leaves were formerly used to provoke sneezing, and that in the 1830s it was still being used as an ingredient in some snuffs.[17]

William Ellis's *Country Housewife's Companion* (1750)

Ellis was both farmer and author and this book is mainly concerned with the duties of the 18th century wife of a husbandman, yeomen or gentleman, such as the management of the farmyard. With this book we return to something closer to the tradition of the receipt book. However, instead of bald recipes, Ellis's anecodatal style frequently gives instances of actual usage. He writes of his own servant being cured of vomiting through drinking a decoction of mint and chamomile, sweetened with treacle, and then having the herbs from which the decoction was made applied hot to her belly.;[18] of a beggar woman advising the wife of Mr Caser (a famous surgeon-apothecary known to Ellis) on how to cure her swollen belly with camomile dipped in spirits of wine.[19] As a final example, here is his account of the use of chickweed in cases of jaundice:

> My next neighbour the widow Howard, who lives on her landed estate, has more experience in medicine than thousands of others, says, old women cure this distemper better than doctors. –That she knew a woman gather a bushel of chickweed for getting and saving the juice of it, purely for having ... the best remedy in the world by

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Figure 2. Atropa Belladonna, from J Stephenson and JM Churchill. *Medical Botany,* 1831. Museum of Royal Pharmaceutical Society

her ready to cure the jaundice at any time of year, I suppose by making a syrup of it.

In 1747 Mrs Howard cured her own niece by giving chickweed juice fasting and, moreover, 'the juice of chickweed has cured several grown persons about Market-Street in Hertfordshire'.[20]

Pharmaceutical Journal (1841 to present)

Finally, we come to a source which is well-known to medical historians, but perhaps less used by historians of herbalism. However its full index makes it easy to find references to particular plants. Here are three examples from issues published in 1841. A paper on the preparation of medicinal extracts detailed a proposed improvement on the existing method of making extract of dandelion by evaporating the milky juice of its roots in open air. (As this had to be done in September, inclement weather was proving a problem.)[21] A paper by Jacob Bell, founder of the Pharmaceutical Society, records the usefulness of distilled water of bitter almonds in cases of distressing itching.[22] Finally, the full text of a lecture on botany includes discussion of the difficulty in obtaining unadulterated medicinal herbs: 'Few specimens of foxglove leaves, collected by ordinary herb collectors, are free from leaves of verbascum or of comfrey'.[23]

Obviously there are many, many more sources that can inform research into plant-based medicine from the early modern period and later centuries. However, those cited here are examples of various types of publication, other than the famous herbals, that can prove useful to those working in this field.

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Author's address: 4, Watson's Walk, St Albans, Hertfordshire AL1 1PA; email: julie.wakefield@hotmail.co.uk

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From Unacceptable to Essential: Pharmacology in Pharmaceutical Education

Trevor E Whaley MRPharmS
Doncaster

In a previous article[1] consideration was given to some of the inter-professional disagreements and political arguments involved in the formation of the Pharmaceutical Society, and the effects they had in producing a clearly defined difference in the teaching of Materia Medica to students of pharmacy and to those of medicine. The medical syllabus included *pharmaco-dynamics* (the consideration of the effects and uses of medicines) whereas this subject was excluded from the pharmacy syllabus to ensure the clear division between pharmaceutical and medical practice. Thus pharmaceutical Materia Medica was a subject based almost exclusively on medical botany and pharmacognosy, although there were minor exceptions; one of the most important being a limited knowledge of toxicology.

The purpose of this article is to follow the progress of *pharmaco-dynamics*, which evolved into present day pharmacology, in terms of its introduction into the basic educational requirements of the Pharmaceutical Society's Qualifying Examinations.

If external influences (primarily the force of medical opinion) were the reason behind this situation, then internal conflict and disagreement can be held firmly responsible for the lack of any improvement, or change of attitude, for almost all of the next three decades. During this period approximately two-thirds of the chemists and druggists in the country remained independent of the Pharmaceutical Society and since the title 'Chemist and Druggist' was not restricted anyone could use it without any formal education or examination.

On Thursday June 12th 1851, Jacob Bell brought *A Bill Regulating the Qualification of Pharmaceutical Chemists, and other purposes in connection with Pharmacy*[2] before Parliament. The basic idea of this was to effectively unite pharmacy by compulsion, in that all chemists and druggists would, after a certain date, be required to be registered with the Pharmaceutical Society, and that entry to membership, thereafter, would be by examination. Unfortunately, because of vigorous amendment, the resulting 1852 Pharmacy Act failed to do this. According to Jacob Bell, speaking after the *Report of the Council on Pharmaceutical Legislation,*[3] this was primarily on the grounds of interference with free trade.

The Act, although now known for its importance regarding, among other things, restriction of the title *Pharmaceutical Chemist*, the statutory requirement of keeping a Register and the appointment of examiners in Scotland, was not greeted with overwhelming enthusiasm at the time. The Pharmaceutical Society had been formed in 1841 by a group of chemists and druggists who were the owners of businesses, and entry to membership did not require the passing of an examination. When the Royal Charter was granted on 18th February 1843 a further opportunity was presented to join under similar circumstances. On both occasions provision was made for assistants, apprentices and students. The 1852 Act did not make a similar provision for membership and, because of the restriction of title, resulted in the possibility of an 'elite' minority of chemists and druggists being able to describe themselves as *Pharmaceutical Chemists or Pharmaceutists* and a majority who could not, unless they were prepared to take an entry examination. There was one very limited relaxation, in that certain chemists and druggists, who provided suitable certification that proved they were in business prior to 1843, could become members without examination. Realising the potential damage to its long term aims that this could cause, the Society, after a special general meeting and with the approval of the Secretary of State, produced a bye-law in 1853 which again allowed membership to those in business on their own account prior to the passing of the Act. An influx of new members resulted, but the majority of chemists and druggists still remained outside of the Society.

In terms of the separation of medical and pharmaceutical practice, there were other consequences of the Act that are particularly worthy of mention. The original Bill included *Toxicology* in the subjects intended for examination. This was removed after the Master and Wardens of the Society of Apothecaries communicated a strong objection to it on the grounds that they considered the term to 'comprise the medical treatment of cases of poisoning, which is not of the province of the Pharmaceutical Chemist'.[4] The Council resolved to erase the word lest it provide a serious ground for objection to the passage of the Bill, but pointed out it was only intended to comprise a knowledge of the chemical nature of poisons and was, in fact, included under the general term Chemistry. The Act went further by stating 'provided always, that such examinations shall not include the theory and practice of Medicine, Surgery or Midwifery', and later made it clear that a 'member of the medical profession' cannot be registered as a pharmaceutical chemist, and if a pharmaceutical chemist obtains a diploma or licence to practice medicine 'his name shall not be retained on the said Register during the time that he is engaged in practice as aforesaid'. In referring to these points Jacob Bell, in the meeting for the *Report of the Council on Pharmaceutical Regulation*, stated that a provision had been introduced into the Pharmacy Bill and 'This was considered a sufficient guarantee that the Society was a *Pharmaceutical* and not a *Medical* body, and it was in accordance with the principles adopted and maintained by the Society from the date of its establishment'.

The foundations for the separation of the two professions had been firmly laid, and pharmaceutical education was now governed by statute.

The years from 1852 to1868 saw an escalation of the internal disagreements within pharmacy, which was not helped by the fact that the medical profession still had considerable concerns about the lack of regulation, education and examination of the majority of chemists and druggists. This period saw the formation of the United Society of Chemists and Druggists (and its subsequent demise), the passing of the Juries Act (which

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exempted pharmaceutical chemists from jury service but not other chemists and druggists), a proposal by the General Medical Council for a Bill which would have effectively placed pharmaceutical education, examination and practice under its control (the Bill was never placed before Parliament), a Bill from the Pharmaceutical Society to regulate pharmacy practice and one from the United Society of Chemists and Druggists with one of its main aims being the restriction of the sale of poisons to registered chemists and druggists (neither of which was accepted) and considerable concern over the risks of poisoning, all of which finally resulted in the Pharmacy and Poisons Act of 1868.

This extremely limited summary of a period of considerable importance to the history of pharmacy does not do it justice. A detailed study of this time is given by S W F Holloway in his political and social history of the Royal Pharmaceutical Society[5]. However, one fact is evident; nothing happened from the formation of the Society to the 1868 Act which would support the inclusion of *pharmacodynamics* in the pharmacy syllabus.

Before leaving this period, there are two considerations which could very easily be overlooked. Anyone, irrespective of education or background, could open a shop under the title of 'Chemist & Druggist' if they were so minded. It was this particular group which caused so much concern to the medical profession and gave them good reason for their numerous attempts at constraint. Conversely, the majority of chemists would wish to work within the boundaries of what would be considered good and acceptable practice. Here, again, there was a problem, since this group was divided into those who were members of the Pharmaceutical Society and those who were not, for whatever reason. On both sides of this particular division the individual would have commenced his career with a long apprenticeship, become an assistant and would finally have purchased his own business and, because of his own knowledge, ability and integrity, would have become known as someone, within his own community, who could be trusted and respected. The only differences between the member of the Pharmaceutical Society who had elected to join, without examination, and his colleague who had not, was that the former had paid his fees and could use the title Pharmaceutical Chemist, whereas, the latter had not paid and could not use that title.

From the outset a major aim of the Society had been education. Plans for examinations had been published by July 1842 and were based on three distinct levels. The introductory Classical Examination for the proposed student required sufficient knowledge of Latin as would be needed to translate the London Pharmacopoeia and a test in simple arithmetic. After an apprenticeship of four or five years the Minor Examination could be taken in the subjects of chemistry, botany, materia medica, pharmacy and the translation of prescriptions. On passing this examination the student was eligible to become an Associate of the Society. By continuing his studies he could progress to the third level, which was the Major Examination, based on the same subjects as the Minor but to a higher standard and with the addition of extra botany and chemistry and (initially) the rudiments of toxicology. On passing this examination, provided he was a manager or was the owner of his own business, he was eligible to become a Member.

C&D and PhC

With the passing of the 1868 Act, this Minor/Associate and Major/Member basis was ideally suited to the new requirements. Chemists and Druggists who were in business before 1st August 1868 would now appear on the new Register of Chemists and Druggists and would join the Society as Associates. They would be listed alphabetically, alongside existing Members (designated Pharmaceutical Chemists), together with the existing Associates who had already passed the minor examination (and could now use the *protected* title Chemist and Druggist). Provision was also made for anyone who had worked, for not less than three years, as an assistant to either a pharmaceutical chemist or chemist and druggist to sit a modified examination to gain admittance to the Register of Chemists and Druggists. The Members of the Society would, in addition, appear on a separate Register of Pharmaceutical Chemists, so that the final publication appeared as The Registers of Pharmaceutical Chemists and Chemists and Druggists.

It is easy to accept that, having finally achieved the unity it had sought for the last twenty seven years, the Pharmaceutical Society would wish to take time to consolidate its new position, and that this would apply particularly to education which would be based upon the principles outlined by Jacob Bell and the founding members. However, with the passing of the *National Health Insurance Act* in 1911, which restricted the right to dispense Insurance prescriptions to chemists, pharmacy was no longer solely responsible for public safety regarding controls on poisons, but was recognised as being an integral part of the system and essential to dispensing.

On the 7th of August 1925 the *Therapeutic Substances Act* received Royal Assent and was reported upon in the *Pharmaceutical Journal* of 22nd August. A description of the substances covered by the Act is worthy of note:

> At present the substances to which it applies are
> (1) vaccines, sera, toxins, antitoxins and antigens,
> (2) the substance commonly known as Salvarsan (dioxy-diamino-arseno-benzol-dihydrochloride) and analogous substances used for the specific treatment of infective disease,
> (3) preparations of the specific antidiabetic principle of the pancreas, known as insulin, and
> (4) preparations of the posterior lobe of the pituitary body, intended for injection.

Of particular note, in the same article:

> It is particularly opportune that by the time the Act comes into force the Pharmaceutical Society's Laboratory for the Biological Examination and Standardisation of Remedial Substances will be in full working order.

The Pharmacological Laboratories of the Pharmaceutical Society of Great Britain were formally opened in June 1926 by the then Minister of Health, the Rt. Hon. Neville Chamberlain MP.

Throughout most of the 19th Century the number of useful drugs available to the medical profession for the treatment of major illness was sadly deficient, but during the first quarter of the 20th Century this was starting to change. Considering the impact on pharmacy of the

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Health Insurance and Therapeutic Substances Acts, the opening of the Pharmacological Laboratories and the expansion of knowledge during the period, it would appear to have been a suitable time for a re-assessment of educational needs. A possible re-interpretation of the original concept of elevating pharmacy in its own right by maintaining a clear division between pharmacy and medicine, could have been reasonably assumed to include, at least, the introduction of a basic knowledge of medical biology into the pharmacy syllabus.

The Society did re-assess its educational requirements, and on 4th April 1925 new regulations appeared in the *Pharmaceutical Journal*[6]. The only mention of 'Biology' was in the *Regulations affecting Registration as an Apprentice or Student* where the requirements were listed as passes in the following subjects, at the required level: English, mathematics, one language other than English and an additional language or one of the following subjects, namely: higher mathematics, experimental mechanics, chemistry, physical geography, physics, botany, biology or geology.

The *Preliminary Scientific Examination*, which had to be taken before acceptance for either the C&D or PhC course was in three subjects: chemistry (for which the student had to have undertaken 200 hours of an approved systematic course of instruction), botany (120 hours) and physics (120 hours). The *Chemist and Druggist Qualifying Examination,* which required a minimum of 720 hours of instruction, was divided into four subjects: pharmacy (including the translation and dispensing of Latin prescriptions), pharmaceutical chemistry, forensic pharmacy and pharmacognosy. The *Pharmaceutical Chemist Qualifying Examination* required 1600 hours of instruction in the following subjects: botany, chemistry, pharmacognosy, pharmacy (including the translation and dispensing of Latin prescriptions) and forensic pharmacy.

The *Pharmacy* syllabus for the C&D course included the 'principles of sterilisation' and required the student to be able to detect prescription errors and 'discover unusual doses, and have a general knowledge of posology'. The syllabus for this subject in the PhC course also included the principles of sterilisation, together with sterilisation of apparatus and materials and the preparation of aseptic and antiseptic dressings. Worthy of note was:

> An elementary knowledge of vaccines and sera and the methods by which they are prepared and standardised,

which would be of particular value to those pharmacists (post-graduate) hoping to continue their education, in the new Pharmacological Laboratories.

An article[7] in 1933 by Prof. J H Burn MA MD, who had been in charge of the Laboratories since 1926 stated:

> The introduction of the teaching of physiology and pharmacology into the curriculum, if accompanied by the maintenance of a high standard in the other subjects, should do much to increase the pharmacist's professional sense. It will illuminate and inform his work. There can be no real interest in preparing a medicine or anything else unless the maker understands the use to which it is intended to be put. At the present time the scope of medicine has become so wide that the general practitioner cannot keep pace with the development of pharmacology.
>
> If the pharmacist has pharmacological knowledge he will be able to assist the doctor in an advisory capacity.

A report of the Society's Syllabus Committee in 1934[8] indicated that biology (divided into botany and zoology) would replace botany in the *Preliminary Scientific Examination*; the subjects for examination becoming chemistry, physics and biology. In the C&D and PhC courses botany was to be discontinued and pharmacognosy considerably reduced. Physiology was to be introduced, and examinations were to be in two principal subjects, pharmaceutical chemistry and pharmacy and three less extensive subjects, pharmacognosy, physiology and forensic pharmacy.

Although the inclusion of any form of human biology in the syllabus indicated a major change of attitude, the actual outcome was still quite limited. In 1948 (the year the National Health Service came into being, with all of its implications for pharmaceutical services) Dr D M Dunlop, the Privy Council Visitor, in his report to the Privy Council on the Examinations in Scotland,[9] although making it clear that he hoped he had not overstepped his remit, included the following:

> It might be thought that of all scientific subjects pharmacology would be the most important for the pharmacist, to which all their previous scientific study - particularly physiology – would lead. It is, therefore, surprising that pharmacology has practically no place in the syllabus of study or in the examinations for the pharmaceutical chemist. It would seem desirable for this to be remedied in the future.

MPS and FPS

In 1950 the new Syllabuses for the Qualifying Examination were published.[10] The three-term C&D course was phased out, and all entrants for the 1952 qualifying examination would take the new two-year course in which physiology was replaced by *Physiology and Pharmacology.* The syllabus for this subject included general physiology, histology, biochemistry and pharmacology. This major change in education also resulted in existing holders of the C&D qualification becoming pharmaceutical chemists (MPS) and existing PhCs becoming Fellows of the Pharmaceutical Society (FPS). It also meant that there would now only be one Register of Pharmaceutical Chemists.

Students undertaking the Society's qualifying course were, finally, to have a formal education in pharmacology, which leads to the observation that prior to 1952 any specific knowledge of the subject that pharmacists possessed had been acquired informally during their apprenticeship, their training, or by self-education. The rise of University Degree courses in the previous two decades had little effect on this statement and has not been considered in this article.

This basic 'time-line' assessment of the introduction of pharmacology raises many unanswered questions. The most significant of which must be: why did it take so long? Contributing factors may have been a lack of vision or expectation on the part of the Society's leaders or members, the impact of two world wars or the effect of public or parliamentary opinion. Added to this was the time taken to achieve a change of attitude in the medical profession, from seeing pharmacy as a threat to accepting the value of the input it could have. Whatever the reasons, one hundred and eleven years from the formation of the Society saw pharmacology raised from being totally unacceptable in pharmaceutical education to being essential.

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Local History of Pharmacy

At the Canterbury Conference in March, Dr Christiane Staiger gave the Editor a copy of a short paper written by Leslie Matthews which had been published in *Medical History* in 1965 (vol 9: 289-291). Matthews had briefly studied the archives of Canterbury, as recorded in two books by JM Cowper (*A Roll of the Freemen of the City 1392-1800* [1903] and *Intrantes:A List of Persons admitted to Live and Trade ... from 1392-1592* [1904]). He used these sources to see how many spicers and apothecaries had been admitted as freemen of Canterbury at different times and how the professions had developed from spicers, grocers and apothecaries to barber-surgeons and chemists and druggists. Finally he hoped that his summary would stimulate others to examine similar lists of freemen for other cities.

BSHP Annual Spring Conference, Abbot's Barn Hotel, Canterbury
29 March to 1 April 2012

Clockwise from top left: President Trevor Whaley introducing a speaker; Officers Roger Mills, Trevor Whaley and Peter Homan at AGM; Saturday lunch; puzzling over the quiz after Saturday dinner; the quiz was set by conference organiser Shirley Ellis and Briony Hudson; Canterbury poster by Norma Cox; audience at first talk.

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BSHP Annual Spring Conference, Abbots Barton Hotel, Canterbury, 29 March- 1 April 2012

Speakers (left to right): Ainley Wade, Peter Worling, Chris Duffin, Renzo Console; Ruth Rodgers, Susan Osbaldstone, Nina Thune

Conference Photos by: Christiane Staiger; Peter Homan; Bjarne Thune.

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Founded 1967

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British Society for the History of Pharmacy

Q House,Troon Way Business Centre, Humberstone Lane, Thurmaston, Leicester, LE4 9HA
Tel: 0116 274 7355, Fax: 0116 274 7365, Email: bshp@associactionhq.org.uk
Website: www.bshp.org

The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

Aims

Promotion of historical studies related to pharmacy.
Advancement of knowledge and propagation of understanding of the history of pharmacy.
Publication of the research work of pharmaceutical historians.
Preservation of pharmaceutical artefacts and historic pharmacies.
Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

Pharmaceutical Historian

The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 or 20 pages and cover.
An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.
Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*
Any illustrations are converted to monochrome for printing. Further details of requirements can be found on the website *www.bshp.org* under Publications.

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Affiliation to the British Society for the History of Medicine (BSHM).

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Editor: Ainley Wade, BPharm, MPhil, FRPharmS, FSP Q House, Troon Way Business Centre, Humberstone Lane, Thurmaston, LEICESTER LE4 9HA
www.bshp.org

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Diary

Please note that evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise noted.

Monday 8 October 2012
To be confirmed.

Thursday 1 November 2012
'Medieval Hospitals and Early Pharmacy in Europe' by Dr Pat Cullum, University of Huddersfield. Joint Meeting with Huddersfield School of Pharmacy at Huddersfield. Details later.

BSHP Annual Spring Conference
Friday March 22nd to Sunday March 24th
To be held at the Best Western Alicia Hotel, Liverpool. See announcement on back cover.

Tuesday 21 May 2013
Joint Meeting with Society of Apothecaries at Apothecaries Hall, Sir Michael Rawlins.

Future dates
Monday 11 February 2013
Monday 7 October2013

Facebook
BSHP has a Facebook page. You can find it by searching for "British Society for the History of Pharmacy" once you have logged into Facebook.

Book Review

Pioneers of Pharmaceutical Industry

Prof. Harkishan Singh

Delhi, India: Vallabh Prakashan, 2011, pp.200 (hardback price Rs 630, £9.99).

In the early 1950s, shortly after independence in 1947, there were 75 large-scale and 1,568 small-scale pharma-ceutical concerns in India; within 60 years, by 2009, the numbers had grown to around 300 and 10,000 respectively. Today, India is one of the leading producers of drugs and pharmaceuticals worldwide; indeed, three of the largest companies (CIPLA, Ranbaxy and Dr Reddy Laboratories) had revenue exceeding US$1 billion in 2011.

What were the origins of the industry in India, how did it develop before independence, and how was it transformed afterwards? These are important questions, yet so far surprisingly little has been written about the development of the pharmaceutical industry in India. Singh begins his latest book with a useful but disappointingly short introduction to the rise of the industry, although it largely reproduces his chapter on the history of the industry in his earlier *Pharmaceutical History of India*. The following seven chapters are biographies, of varying lengths, of individuals identified by Singh as pioneers of the pharmaceutical industry.

In a brief preface Singh tells us that he has selected those who began drug manufacturing during the colonial period. They are presented largely in order of their year of birth, starting with Prafulla Ray (1861-1944) and ending with Amrut Mody (1914-1999). Most are new to Singh's list of pharmaceutical heroes, although one, Homi Nanji, has already been the subject of a biography in Volume 5 of his *Builders and Awareness Creators of Modern Pharmacy*.

Profulla Ray began small scale manufacturing in a rented house in 1892; it was the beginning of what developed into the Bengal Chemical and Pharmaceutical Works. Tribhovandas Gajjar was an innovator who had a hand in many start-ups; a small factory known as Parel Laboratories was opened in Bombay in 1903 to manufacture tinctures; a distillery was started in 1905, and soon the firms

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merged to form the Alembic Chemical works in Baroda, which became a limited company in 1907. Singh's third pioneer is an Englishman, Harry Cooper, who had worked for Burroughs Wellcome in Dartford between 1913 and 1919, before moving to India to be chief chemist with Smith Stanistreet & Co.

Cooper is followed by Khwaja Hamied, who was born in Iran in 1898 and went on to found CIPLA (Chemical, Industrial and Pharmaceutical Laboratories) in 1935. Singh's fifth pioneer is Apostolos Raptakos, who was born in Tricala in Greece in 1889, moving to India in 1926 as an import agent for French pharmaceuticals. He met an Englishman, WH Brett, and together they founded the pharmaceutical company of Raptakis and Brett in Calcutta in 1930; they moved to Bombay and started local manufacture in 1934 in a new factory in Worli.

The sixth pioneer is Homi Nanji, who was born in Bombay in 1909 and initially graduated in science from the University there, later gaining a bachelor's degree in pharmacy. Nanji started his own business in 1948, and was associated with several companies including Italab, Pharmed Private Ltd, Wander Pharmed and Indian Schering. Singh's final pioneer is Amrut Mody, born in 1914, the founder of Unichem Laboratories, which today is based in Mumbai with six drug manufacturing facilities across the country and employs around 3,000 people.

Almost half the book consists of appendices which mainly consist of addresses made by Singh's pioneers. The first is Praful Ray's 1920 presidential address to the Indian Science Congress on 'the dawn of science in modern India.' The second is an interview with Ray which took place in 1921. Appendix 3 is a plan for a technical research institute proposed by Khwaja Hamied in 1927. The remaining chapters relate to developments which occurred after independence; appendix 4 is Hamied's presidential address to the second Indian Pharmaceutical Congress in Patna in 1949, entitled 'problems facing pharmacy in India.' Appendices 5 and 6 are presidential addresses to the Indian Pharmaceutical Congresses by Homi Nanji in New Delhi in 1955 and by Amrut Mody in Cuttack in 1972.

Singh's focus then is not so much on the origins of the Indian pharmaceutical industry but on the 'great men' who pioneered it. Most of the developments described took place during the Raj, the period of British rule. These have now been explored by a number of historians, such as the chapter on 'The Indian drug industry under the Raj' in Biswamoy Pati and Mark Harrison's book *Health, Medicine and Empire: Perspectives on colonial India* (London: Sangam Books, 2001). Nevertheless Singh provides some interesting background and the contents of the appendices offer useful primary sources for the pharmaceutical historian.

Continued on p. 64

Medical supplies for the expeditions of the heroic age of Antarctic exploration: ophthalmic preparations

Dr H R Guly FRCP, FCEM

Retired consultant in emergency medicine, Derriford Hospital, Plymouth, PL6 8DH

This paper describes the treatment of snow-blindness and other eye problems during the heroic age of Antarctic exploration (1895-1922) and the ophthalmic drugs taken on these expeditions.

Introduction

One of the commonest medical conditions on the expeditions to the Antarctic (and Arctic), and the commonest eye problem encountered, was snow blindness. This should be preventable but that is not always possible[1] and it was a significant problem for the early Antarctic explorers, being mentioned in almost every book about the expeditions of the time. However the term 'snow blindness' as they used it, probably covered more than just the photokeratoconjunctivitis that is now called snow blindness.[1] An understanding of how it was treated is important for the understanding of these expeditions and throws light on the medical management of eye problems at the time. The aim of this paper is to explain how eye problems were treated and to describe the ophthalmic drugs taken to the Antarctic.

Treatment of snow blindness

Resting the eyes was important and Dr Edward Wilson (a member of both of Scott's expeditions) wrote that 'sleep was the best and quickest cure of all, even if an injection of morphine had to be given to produce it.'[2] If that was not possible, reducing the light entering the eye helped. Bowers (who died with Scott and Wilson on their return from the South Pole) wrote:

> been enduring the pains of hell with my eyes ... by sticking plaster over my glasses except one small central spot I shut out most light and I could see the points of my ski …[3]

This had potential problems: on the Australian expedition:

> Hurley was snow-blind and had one eye covered. He looked very comical feeling his way over the crevasses, but he probably did not feel over-humorous.[4]

Further treatment depended on where you were:

> If treated early the condition gives little trouble. Even bad cases are easily treated on board ship, or at a base, by protecting the eye from strong light, and frequent bathing with warm water, boracic lotion, or, better still, very dilute zinc sulphate.[5]

The Swedish expedition (1901-3) combined boracic acid and zinc sulphate.[6] Standard treatment on Scott's, Shackleton's and Mawson's expeditions was 'zinc sulphate and cocaine, the first to cure and the second to deaden the pain of snow-blindness.'[7] Eye drops decompose over time so Wellcome produced its ophthalmic products in two forms. The products trademarked as 'Soloids' were designed to be made into fresh solutions for use as eye drops but the 'Tabloid'

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preparations were small, paper-thin tablets designed to be put directly into the corner of the eye or into the conjunctival sac.[8] These were the only preparations that could be used in the field, as solutions would freeze.

The word 'Tabloid' can cause confusion. To Burroughs Wellcome, it was a trademark and was used for photographic equipment and tea as well as for medical products but it was also commonly used to denote the tablet form of medication.

Dr Alexander Macklin (surgeon on two of Shackleton's expeditions) wrote:

> For the non-medical man the best treatment is first to place in the eye a cocaine lamella to relieve pain, and follow it in a few minutes by another of zinc sulphate.[5]

In a letter to the *Lancet* he quoted a dose of 'cocaine 3 per cent followed by zinc sulphate ¼ per cent in tabloid lamellae'.[9] Mawson, leader of the Australian Antarctic Expedition, described the same treatment:

> The stock cure for this very irritating and painful affection is to place first of all tiny 'tabloids' of zinc sulphate and cocaine hydrochloride under the eyelids where they quickly dissolve in the tears, alleviating the smarting, 'gritty' sensation which is usually described by the sufferer. He then bandages the eyes and escapes, if he is lucky, into the darkness of his sleeping-bag.[10]

There was another way of providing topical zinc sulphate. Taylor (a member of Scott's *Terra Nova* expedition, 1910-3) describes how

> Forde got a bad touch of snow-blindness. Debenham got out the medical chest. He ground up some $ZnSO_4$, picked it up on a paintbrush, and dropped it in the corner of Forde's eye.[11]

This appears to have been a recognised treatment as the Burroughs Wellcome no. 91 'Tabloid' brand ophthalmic case (Figure 1) contained nine tubes of ophthalmic products, a pestle and mortar and two camel-hair brushes.[12] An alternative way of handling the tablets was the use of a 'vulcanite rod which is rendered electric by friction and used for picking up the little ophthalmic discs.[13] The description of the cases taken on the expedition makes no mention of brushes but does mention the vulcanite rod,[14] though I have found no description of its use in the Antarctic literature.

Scott did not think highly of this treatment, noting that zinc sulphate

> is one of those remedies which might be thought to be worse than the disease, for it gives the victim what he calls 'gyp' and generally keeps him awake for the next hour or two with throbbing eyeballs. Cocaine has only a very temporary effect, and in the end seems to make matters worse.[15]

Dr Edward Atkinson (surgeon on the *Terra Nova* expedition) agreed that zinc sulphate and cocaine was 'extremely painful and several applications were needed before they afforded any relief.'[14] With increasing use, the dose of cocaine needed to be increased. John Cope (a biologist who acted as doctor on Shackleton's Ross Sea Party, 1914-7), wrote:

> It was noticed that the worse the snowblindness the more frequently cocaine was used that it was necessary to increase the dose before any relief came and in the case Joyce [who suffered worst] this drug would not give any such relief after a time.[16]

There were also other side effects: Laseron (on the Australian expedition, 1911-4) complained that it had

> the curious after-effect of distorting the lens of the eye so that it is out of focus. It made me long-sighted and for a few days everything nearer than a few feet was quite blurred. This gradually wore off, however.[17]

This would have been the effect of drug-induced mydriasis.

Atkinson reported that 'Hemisine [adrenaline] 1 in 1000 is painless and the most effective remedy'[18] and he also used it in a strength of 1 in 2000,[19] but Macklin warned that

> although Adrenalin and pituitary extract gave striking and instantaneous relief for a short time … their use was followed by an intense aching of the eye-balls and violent headache.[9]

On his first French expedition (1903-5), Dr Jean-Baptiste Charcot used 'an eye ointment containing zinc sulphate, laudanum [tincture of opium] and cocaine.'[20] Roald Amundsen describes using 'red eye-ointment'[21] but also probably used similar medication as Scott and Shackleton as they all took Burroughs Wellcome medical cases.

Erich Drygalski, the leader of the first German expedition (1901-3), mentions the discomfort of using 'lunar caustic[22] (silver nitrate) for snow blindness and this discomfort helped to persuade people to wear their goggles.

Boric acid, zinc sulphate and silver nitrate were among various chemicals used at the time for the treatment of conjunctivitis. Others included alum, carbolic acid, potassium permanganate, chinosol (oxyquinolin sulphate), corrosive sublimate (mercuric chloride) and tannic acid. These were all either astringents or antiseptics. At the time it was thought likely that the benefit was due to the mechanical removal of organisms and inflammatory products by the fluid in which the chemical was dissolved,[23] but conjunctivitis is a self-limiting condition and the evidence of benefit from any of these agents is limited. However many were still in use more than 40 years later [24] with zinc sulphate being used for angular (*Moraxella*) conjunctivitis[25] and silver nitrate still being used for the prevention and treatment of neonatal gonococcal ophthalmia.[26,27]

Topical laudanum was still being used by some for eye problems as late as the 1940s[28] despite it being shown in 1910 that topical opiates had no analgesic properties.[29] The British expeditions also took 'tabloids' containing opium (see Table 1 , p 49).

Non-pharmacological treatments were also used and sometimes were considered superior to drugs, probably because of the discomfort caused by standard treatments. Edward Evans (second in command on the *Terra Nova* expedition) believed 'the best cure in the world … to be a poultice made of hot tea leaves'[30] and Atkinson also describes the use of this, even when other treatments were available.[19] Another treatment was a 'snow poultice'[31] and Charcot found cold compresses better than some conventional treatment: 'I made up a lotion for our eyes, but cold compresses gave us greatest relief'. An advantage of this treatment was that it was 'not difficult to get hold of here …'[32]

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Long-term problems

A number of expedition members blamed long-term eye problems on polar travel. This was probably largely because of the sustained exposure to ultraviolet light but some of the drugs may have contributed. On sledging expeditions topical treatments were used for prolonged periods. Andersson on the Swedish expedition describes how 'as a preventative measure, I … dropped the solution [zinc and boracic acid] into my own eyes and Grunden's every day'[33] and Wilson reports how he 'cocainised it [left eye] repeatedly on the march.'[34] Repeated use of cocaine may cause corneal opacification[35] and prolonged anaesthesia of the cornea would predispose to trauma and any resultant corneal scarring might also affect vision. Prolonged pupillary dilatation from the repeated use of cocaine for days, or even weeks, at a time, may also have had long term sequelae.

Other eye problems

Similar symptoms also resulted from exposure to smoke. When expeditions were marooned, without sufficient stores, they used seal blubber as a fuel which, when burned, produced thick, oily, brown fumes. In a closed environment, these irritated the eyes (and lungs). One group called the smoke 'smitch' and called the condition 'smitch-blindness[36] and it was also called, 'stove-blindness'[36] or smoke blindness[37] and was almost certainly treated in the same way.

The other main problem was trauma. On Shackleton's *Nimrod* expedition (1907-9), Mackintosh was injured when the hook from a crane swung and hit him in the eye. Dr Marshall's diary states

> Examined him & found what appeared to be a portion of retina protruding through eye. Joyce tells me that when he fell he saw lens lying on his cheek. Kept him under, 1st atropine and cocaine then cocaine …

and later he required his eye removing.[38]

On the *Scotia* expedition (1902-4) the boatswain developed a hyphaema when hit in the eye with a fragment of stone while quarrying[39] and on Cope's expedition (1920-2) on which only two men overwintered (neither medically qualified), one suffered what sounds like a corneal abrasion.[40] As noted above, when fuel was low, blubber stoves were used. This did not burn evenly and on the winter journey to Cape Crozier (1911), Cherry Garrard wrote that the stove

> spouted a blob of boiling oil into Bill's [Wilson's] eye. For the rest of the night he lay, quite unable to stifle his groans, obviously in very great pain: he told us afterwards that he thought his eye was gone.[41]

We are not told how these injuries were treated but there appear to have been no long term consequences.

Ophthalmic drugs

Burroughs Wellcome used the Antarctic connection and testimonials in their advertising. Figure 1 shows an example of a testimonial on their ophthalmic products from Dr Wilson.

The ophthalmic drugs were usually supplied in their number 90 or 91 ophthalmic cases (see Figure 2). These were the same product except that the number 90 was in leather and the number 91 was made of metal. The *Terra Nova* expedition took three number 91 cases. The contents varied slightly between expeditions but the ophthalmic drugs supplied to Scott's *Terra Nova* expedition are shown in Table 1.

The advertisements quoted above[12] and shown in Figure 2 says that the no. 91 case contained nine tubes of ophthalmic products. However the list above contains 15 products: I cannot explain this.

The 12 sledging medical cases clearly had to be light, and each carried 12 tubes of ophthalmic 'Tabloid' product DD.[14] This was zinc sulphate gr. 1/250 and cocaine hydrochloride gr 1/20, 20 tabloids per tube.[42]

Shackleton's *Endurance* expedition (1914-7) took No. 90 ophthalmic cases.[43] The drugs are largely the same but there are a few differences and it is interesting to speculate on the reasons for some of these. Argyrol replaces boric acid as an antiseptic. Argyrol was trademarked in 1902: Dr Wilson who chose the drugs to take on the *Terra Nova* had stopped practising medicine by that date and so would never have used it but the doctors on the *Endurance* expedition would have known about this drug. Hemisine was probably introduced as a result of Dr Atkinson's enthusiasm for the drug. Atropine sulphate changed to atropine hydrobromide in combination with cocaine: this is almost certainly a product change by BW&Co as both come with the same product label: "B". There is no fluorescein.

The Australian Antarctic Expedition also took a Burroughs Wellcome equipment[44] and so presumably took the same drugs.

Charcot's preparation for snow-blindness, mentioned above, does not appear to have been a commercial preparation as Gourdon says that Charcot made up a solution which they found excellent:

Zinc sulphate Cocaine chlorhydrate	} 0.05 centigrammes [sic]
Laudanum	10 drops
Water	10 grams[45]

I have not found a full list of drugs taken by the French expedition but I presume that they would have included all the drugs that were decreed for ships by the Ministre de la Marine et des Colonies as described in a recent doctoral thesis.[46] There are no eye drops listed in the regulations of 1896 (though eye solutions could have been made up) but those of 1908 specify atropine and 'érésine' which I presume is an error that should say 'ésérine' (eserine or physostigmine).

The intended use of these preparations is more easily determined from the notes of non-medical explorers than from any medical notes. Thus Spencer Smith, a member of Shackleton's Ross Sea Party, wrote in his diary (spelling mistakes not corrected):[47]

> Phys. Sal. Causes contraction of eye-muscles. Relieves pain. 1 tab in 11 min[ims]. aq.
> Hemisine Snow blindness 1 tab in white of eye or 1 tab in 11 min. aq.
> Argysol [argyrol]Acute inflammation (when flowing). 1 tab in 12 min. acq.

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"DISCOVERY" ANTARCTIC EXPEDITION.

Though there was but little serious illness on the "Discovery" during the recent Antarctic Expedition, the 'Tabloid' preparations and the cases were put to a fairly rigorous test, not only in the ship, but on the various sledge journeys that were undertaken, during which they experienced temperatures as low as 68° below zero, and much rough handling without any loss in efficiency and usefulness. Certain of the 'Tabloid' Ophthalmics were freely used for snow blindness, and were found to be most convenient.

Edward. a'Wilson.

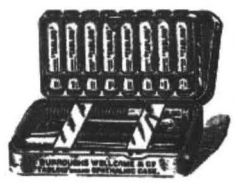
Figure 1. Testimonial from Dr E. Wilson. From Burroughs Wellcome & Co. *Anaesthetics Ancient and Modern: an Historical Sketch of Anaesthesia*. New York: Burroughs Wellcome & Co., 1907: 88.

No. 90. Ophthalmic 'Tabloid' Brand Pocket-Case

Measures 2½ × 1½ × 1in. Fitted with *nine* tubes of 'Tabloid' and 'Soloid' Ophthalmic products, solution dropper, mortar, pestle and two camel-hair brushes. In morocco or brown seal leather ... 10/6
In crushed morocco or brown crocodile leather 12/6

No. 91 Aseptic Ophthalmic 'Tabloid' Brand Pocket-Case

In nickel-plated metal. Measures 2¼ × 1¼ × ¾in. Contents as No. 90 Case. Price 10/6



No. 91. ASEPTIC OPHTHALMIC 'TABLOID' BRAND POCKET-CASE (Registered)

Figure 2. Burroughs Wellcome No. 91 ophthalmic case. From advertisement in *The Medical Press and Circular* 22 Dec 1909, page x.

Corrosive sublime. Sterilizing the eye or eye wash 1 tab in 5 min. water

Zinc sulphate acute inflammation (pain)

Pilo. Carpine Blurred vision with contractions (spasms). Can be used instead of Physotigmine). 1 Tab in 11 min. aq.

Philo-carpine As above. The cocaine obviates pain which accompanies a prolonged action of Pilocarpine. 1 tab in 11 min. aq.

Tropa Cocaine Local anaesthetic (no action on pupil. Acts more quickly than cocaine. 1 tab on eye.

Phys. Sal & Tropacocaine Hdr. Relieves pain (for prolonged use in substitution where phys. Sal. would otherwise be used. 1 tab in 10 min. aq.

Atropine Sulph. For dilatation of the iris, where an ulcer forms & endangers the pupils. 1 Tab in 10 min. aq. or on eye.

Cocaine Hydrochloride relieves pain

Tropacocaine 1 tab in 12 min aq.

All water must be boiled.

[Note: 1minim (min) = about 0.06 mL]

Irvine Gaze's diary contains almost identical information (though with different spelling mistakes) and had clearly been copied from the same source, though he adds that sodium bicarbonate (that Spencer Smith says is for flatulence) may be useful in the eye. He says:

Sodium Bicarbonate Uses (Irritation of eye) Use after irritation is removed (Pain due to cold etc.) Never use more than 1 Tab at time. [48]

Table 1. Contents of the No. 91 ophthalmic cases supplied to *Terra Nova* expedition[14]

1 Pair of metal forceps.
1 Magnetic Spud
'Tabloid' ophthalmic products. One tube each of:

	Product code	No. in tube
Atropine Sulphate gr. 1/200	A	25
Atropine Sulphate gr. 1/200 & Cocaine Hydrochloride gr.1/20	B	25
Atropine Sulphate gr. 1/200 & Cocaine Hydrochloride gr.1/20	C	12
Homatropine* hydrochloride gr. 1/400	H	25
Physostigmine salicylate gr.1/500 & Tropacocaine hydrochloride gr. 1/100	G	12
Pilocarpine nitrate gr.1/500	K	25
Tropacocaine hydrochloride gr.1/30	L	12
Pilocarpine nitrate gr. 1/500 & Cocaine hydrochloride gr. 1/200	M	25
Homatropine* hydrochloride 1/200 & Cocaine hydrochloride gr. 1/24	O	25
Zinc sulphate gr. 1/250	R	25
Opium & Zinc sulphate		
Physostigmine salicylate gr. 1/600e	E	25
Fluorescein* gr. 1/2000	D	25
Soloid products		
Boric acid gr. 6	P	abundance
Corrosive sublimate gr. 1/1000	J	25

*Misspelt in reference
[Note: 1 grain (gr) = 64.8 mg]

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Author's address: The Shrubbery, Bedford Rd, Horrabridge, Yelverton, Devon, PL20 7QH; hguly@aol.com

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Notes on Soaps, Victorian pharmacies and customer service

Dr John K Crellin
Newfoundland, Canada

A recent article in the *Pharmaceutical Historian* on seventeenth-century Italian soaps reminded me that soaps from Florence's famed pharmacy, Santa Maria Novella, can nowadays be purchased almost anywhere, and that the history of soaps features chemists and druggists in many ways.[1] The following notes look at their place in the expanding marketing of soaps in Victorian times. Admittedly it is a footnote topic, but it offers a reminder that a close study of the merchandise sold by chemists and druggists opens up ways to consider pharmacy's roles in society.

Various factors helped to expand the commercialisation of soap, ranging from the repeal of the British soap tax in 1853 to new synthetic perfume materials that led to less expensive products and hence a general widening use of toiletries and perfumes.. 'Fashion,' once limited to the genteel classes, began to reach more levels of society. Aspirations of being fashionable *and* healthy, in line with Victorian values of cleanliness and domesticity, were to spread throughout Britain and its empire including Newfoundland that serves here as a representative colony (it only joined Canada in 1949).[2]

Although often facing hard economic times – commonly linked to vagaries of the staple occupation of fishing – Newfoundland offers mirror images of Victorian pharmacy and shopping in Britain. Granted the images are not sharp, for Newfoundland stores faced influences from mainland North America; moreover, they could also be seen as 'behind the times' in, for instance, lighting and shop window modernisation. Even so, a wide range of British drugs and merchandise as well as distinctive furnishings, shop odours, and the growth of window shopping, contributed to making many Newfoundland chemist and druggist shops similar to those in Britain. (cf. Fig. 1). Moreover, an early description of 'mixt, various, universal' was apt for their broad range of merchandise, of which toiletries were prominent.[3] As such drugstores contributed to Victorian shopping becoming an 'experience.'[4] In turn, this helped to foster the growth of consumerism, at least those aspects fed by an individual's desire for possessions and, often, wishes to emulate others.[5]

Around 1870 in the capital city of St. John's and another major fishery town, Harbor Grace, Newfoundland druggists (five were advertising soaps at the time) were undoubtedly affected by non-drugstore competition that competed for an island population of no more than 150,000.[6] Local grocers, hardware stores, hair dressers, and booksellers/stationers were all selling many of the same toiletries, and even over-the-counter medicines.[7] Competition, too, came from sales by at least one Boston druggist and, by the turn of the century, from catalogue shopping such as from Eatons in Canada.[8]

Figure 1. The attractive ornate oak fittings, now housed in the James J. O'Mara Pharmacy Museum, St. John's, were imported from Britain in the 1880s for the Connors drugstore in St. John's.

Given this, did chemists and druggists make specific efforts to offset the competition by offering customers 'expert' advice on health matters including for soaps? Although the record is silent on this, every reason exists to believe customers likely recognised their authority when asking for guidance on which soaps to choose, maybe because of experiences of irritation resulting from excess alkali in cheap soaps. There were, too, medicated soaps widely promoted from the 1850s onward, mostly for skin complaints. But which one to use? Both sulphur and mercurial soaps were commonly sold for a variety of conditions ranging from rashes to outbreaks of the readily transmissible scabies. Perhaps, too, customers' questions arose about the abundant, sometimes contradictory advice in newspapers, books and so on, not to mention the 'messages' with soap and toiletry promotions that interwove cleanliness with fashion, often with the implication that people who did not follow it deserved to suffer ill-health.

Differing qualities and appearances of soaps that bore the same or similar name also had to be dealt with. Examples advertised by Newfoundland druggists around 1870 included the well-known *Castile* soaps (white or marbled, sometimes perfumed, and reflecting the long history of quality soap from Spain's Castile region) and *Windsor* soaps that were invariably scented. The *Brown* or *Old Brown Windsor* soap was also apparently well known; it was generally a white soap that had become mellowed with age, or coloured with burnt sugar or other dyes. [9] A generic label is shown in Fig. 2, and, in view of

Figure 2. Front of wrapper (c. 1870) The 'Three Squares, ' written on the flaps refers to three squares of soap in the package.

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inconsistency, many customers probably preferred a reputable brand such as Low's *Highly Perfumed Brown Windsor Soap* (Fig. 3), well recognised in Britain.

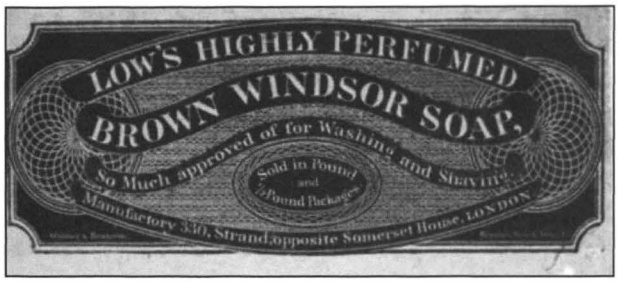

Figure 3. Label for Low's Brown Windsor Soap (c. 1870).

The drugstores also advertised other soaps, some included under the term 'fancy soaps' or fitting the description of 'good soaps' that, in the 1860s, were being 'manufactured at a very moderate price by the principal London perfumers .... to satisfy the most economical.'[10] Druggists sold *glycerine* soap that was promoted in 1866 as 'superior to all other toilet-soaps for its genial action on the skin;' however, one wonders how many druggists ensured their stock avoided the 'so-called "glycerine-soap" of the shops' that contained 'not a particle' of glycerine.[11] Other soaps, though well-known, likely had more limited sales, for instance, lemon-scented *honey* soap, apparently named for its yellow colour, *almond* soap (scented as the name implied), and *sand* soap, containing sifted sand, with a specific market for dirty, oily, fishy hands, etc.

By the 1860s both drug and other St. John's stores probably stocked (though advertisements came later) *Pears* soap from Britain, already popular with its claim to make the skin transparent![12] The later Victorian success of the soap owed much to the celebrated 'Bubbles ' picture often seen on advertising placards inside stores. Customers in the early 1900s might even have bought a postcard with the same picture (see Fig. 4); after all, soon after cards became popular from around 1900 onwards, many drugstores had racks of them for sale.

Shaving soap and brushes were also increasingly sold in Victorian times, though often merely to contour the popular beards and moustaches. Producers wanted customers to appreciate a ready lather in hard or soft, hot or cold water, and on the ability to soften the hair or stubble so as to make shaving rapid, easy, and comfortable.

Price was always an issue for customers who looked for both bargains and integrity in stores. Unfortunately, little information is available on profit margins for soaps although account books from elsewhere than Newfoundland suggest that it could be around 50% (cf. Fig. 5), though undoubtedly the amount depended on competition. Nor is there information about whether Newfoundland druggists, as some did elsewhere, made their own soaps that helped them cater to customers' individual needs. If they did, they were in line with many

Figure 4. An early 1900s postcard of John Millais' famous painting 'Bubbles' that was used for advertising by the Pears company for decades after the late 1880s. Permission had to be given to add a bar of the soap to the picture (bottom right hand corner).

Newfoundlanders, particularly in rural communities, who made their own admittedly inexpensive soaps until well into the 1900s. Some reserved 'factory-made toilet soap ' for Sunday use. However, making one's own soap

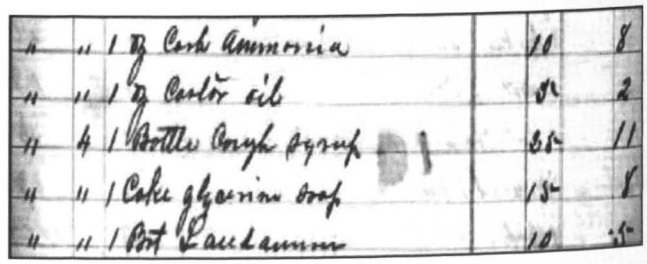

Figure 5. Entries in an anonymous druggists' account book titled 'Sales and Profits in Drugstore' (January to October 1880). Although not from Newfoundland, the mix of toiletries and medicines sold were clearly in line with St. John's druggists. The cakes of soap sold as listed throughout the accounts were *glycerine* (as above), *Castile*, *carbolic* and an unnamed 'soap' maybe one produced in the store. The profit on each was around 50%.

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– from 'water and fat and Gillett's lye' – was a messy chore and by 1915 it was reported that 'nowadays few [Newfoundlanders] boil their own soap when it can be procured from any grocer or small shop.'[13]

The above notes are merely a glimpse of a chemist and druggist's role in the widening marketing of Victorian soaps. In the absence of documentation, it is mere supposition to suggest that customers saw chemists and druggists as more knowledgeable about health implications than other store owners; yet that is not unreasonable given that the pharmaceutical side of the business proclaimed knowledge of science and medicine. Moreover this helped with local reputations. When one of the doyens of Newfoundland pharmacy Thomas McMurdo died in 1880, he was remembered as

> a more courteous man never handed a dose of medicine to a sick customer ... His style in his shop sent many a man home in better health without his even taking his medicine.[14]

And McMurdo's son-in-law druggist John McNeill was featured in a poem (1871) as 'kind McNeill' who provided relief to those 'vexed with the ills of life.'[15]

Soaps, of course, are not medicines, but building a reputation amid growing competition was an important component of successful business/practice in the laissez-faire climate of Victorian times when shopping became more and more an experience. A local reputation was equally valuable into the twentieth century until somewhat diluted by self-service and changing dispensing practices from around the 1950s onward.

As commercial promotions intensified around self-service toiletries and medicines so that many customers found choices difficult if not confusing, barriers also emerged in many pharmacies to quick and easily accessible professional advice. In such a context, exploring the nature of customer services in the past can be a salutary learning exercise.

Author's address: jcrellin@mun.ca

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Outposts of Empire: the Dawn of Pharmacy in the Straits Settlements 1786 to 1867

Dr Stuart Anderson

London School of Hygiene and Tropical Medicine

The Straits Settlements, consisting of Penang, Singapore and Malacca, were part of the British Empire for nearly 130 years. For the colonial authorities they presented considerable challenges, which included the distances involved, the tropical climate and the diversity of the local population. In the early years the settlements were governed indirectly by the British East India Company in India rather than directly from Britain. The settlements grew rapidly, and presented attractive opportunities for pharmaceutical entrepreneurs. But the early pharmacy pioneers could rarely rely on any support that might be forthcoming from either Britain or India, and needed to be adaptable and self-reliant.

Figure 1. Map of Straits Settlements showing Penang, Malacca and Singapore.

This article describes the emergence of pharmacy in the Straits Settlements during the period between the acquisition of Penang in 1786 and the eventual establishment of the Crown Colony in 1867. For much of this period, especially in the early decades of the nineteenth century, pharmacy in Britain itself was in an emergent state. Before the foundation of the Pharmaceutical Society of Great Britain in 1841, pharmacy was subsumed within the medical profession, which consisted of four groups of practitioners; physicians, surgeons, apothecaries, and chemists and druggists.

In the colonies medical practitioners often needed to be all four; this was particularly so in newly established colonies and those at the far corners of the earth. This article illustrates how pharmacy as a distinct activity gradually emerged in the Straits Settlements, and how this particular outpost of empire was shaped by many influences, not only from Britain but also from China, British India and Australia. It begins, however, with a brief account of how Britain came to be involved in the Straits Settlements in the first place.

The origins of Britain's involvement in the Straits of Malacca

Between the sixteenth and nineteenth centuries the importance of the Malay archipelago to the European powers gradually increased, as a result of its key position in the trade route between India and China, and because it was home to some of the spice islands. Over the years particular parts were occupied by various European countries. The Portuguese first arrived in Malacca in 1509, but their early dominance was challenged by the Dutch, who by the seventeenth century controlled most of the ports in the region.

Initially the British presence in the area was very limited. Penang had been acquired for Britain by Sir Francis Light in 1786, when it was renamed Prince of Wales Island. But things started to change in 1818 with the appointment of Sir Thomas Stamford Raffles as the Lieutenant Governor of the British colony of Bencoolen (now Bengkulu) on the south west coast of Sumatra, facing the Indian Ocean. The East India Company had established three centres of government (or Presidencies) at Madras, Calcutta and Bombay to enable it to rule India, but its influence extended much further east. Importantly the Company had a monopoly in the trade between Britain and China; Chinese goods destined for Britain, and British goods destined for China, could only be carried directly between the two countries by the East India Company.

The Company also established its own army in order to maintain order, consisting of British officers supported by sepoys (Indian troops recruited and trained by the British). Initially the three Presidencies each had their own army, but all three were brought under a central command in 1773 when the Government of India Act was passed. The Company instituted the Indian Medical Service in 1764, to be responsible for the health of all Europeans in India, both military and civilian. Its role included the supply of medicines. In India, officers of the Indian Medical Service headed both military hospitals and civilian hospitals in the three presidency towns, a model that was to be repeated in other colonies. They also accompanied Company ships, and marched with armies on expeditions.

Bencoolen was a long-established British fort, originally known as Fort York. In 1685 it became a base under the control of the Madras Presidency for the protection of British vessels engaged in the trade between India and China and crossing the Indian Ocean. Bencoolen was a Presidency in its own right between 1760 and 1785, becoming subordinate to the Bengal

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Presidency between 1785 and 1825. Pressure from Indian-based British merchants and from manufacturers at home, desperate for markets for their products, forced the English East India Company to relinquish its monopoly of the Indian trade in 1813, although the China trade remained in the company's hands for another twenty years, until 1833.[1]

Raffles was determined that the British should replace the Dutch as the dominant power in the region, as the trade route between China and British India, which passed through the archipelago, had become very important as a result of the opium trade. Raffles' plan was to challenge the Dutch by establishing a new port along the Straits of Malacca. He persuaded his boss at the British East India Company, Lord Hastings (the Governor-General of India) to fund an expedition to find one. He arrived in Singapore on 28 January 1819 with a detachment of European and Indian troops in seven ships. The next day he went ashore with Major William Farquhar and one sepoy.[2] He found a small Malay settlement consisting of a few hundred people at the mouth of the Singapore River, and immediately recognised its merits as the new port.

A formal treaty allowing the British to establish a trading post on Singapore was signed on 6 February 1819.[3] However, Raffles himself returned to Bencoolen soon after, where he spent most of his time trying to make Bencoolen profitable,[4] leaving Farquhar in charge. Singapore's transformation was extremely rapid; the settlement's population grew quickly, reaching around 5,000 by 1821 and 10,000 by 1825. Over the same four year period trade volume increased from $8 million to over $22 million. Singapore's trade quickly outstripped that of Penang and Malacca, and largely as a result of Chinese immigration its population rose further, from 10,000 in 1825 to 81,000 in 1860.

In 1824 Malacca was transferred to Britain in exchange for Bencoolen through an Anglo-Dutch Treaty. So by 1824 three British settlements had been established on the Straits of Malacca, and in 1826 the East India Company united Singapore with Penang and Malacca as the Incorporated Settlements of Prince of Wales Island (ie Penang), Singapore and Malacca, otherwise known as the Presidency of the Straits Settlements.[5] Penang was designated the capital, and Penang's governor, Robert Fullerton, became the first governor of the Straits Settlements. The Straits Settlements were thus British possessions under the control of the East India Company. Their officials from Penang and Bencoolen quickly brought Singapore's administration into line with that elsewhere.[6]

Early development of Singapore

The years between 1826 and 1867 were ones of enormous development in Singapore. Until 1833 when the Company lost its monopoly of the China trade, goods were usually transhipped at Singapore, often only on paper, with commodities remaining in situ in the ships anchored in the harbour.[7] Steamships were rarely seen in Singapore during the first twenty years, but began to frequent the port in the 1840s. In 1840 the Peninsular and Oriental Steam Navigation Company (P&O) was incorporated by Royal Charter (having added the word oriental to its name) and forged links to Egypt and to India by the overland route prior to the opening of the Suez Canal in 1869.[8] In 1845 it began monthly sailings to the Far East, and the following year a regular steamship service was inaugurated between Singapore and Calcutta. In 1855 P&O expanded its schedule further to provide a fortnightly service from Europe. The Suez railway, opened in 1858, provided greater comfort and safety to passengers and security for mail. By the mid-1860s English mail was reaching Singapore in less than five weeks.[9]

The island's infrastructure expanded rapidly as it attracted more shipping. Investment banking houses opened up, including the Oriental Bank in 1846, Mercantile Bank in 1855, and Chartered Bank in 1859. Companies such as P&O and Jardines established offices there. Trade was boosted by the British acquisition of Hong Kong in 1841, a dry dock was constructed in the 1850s, and at the same time Singapore became a major coaling station for steamships.[10]

Such rapid expansion of a new colony presented substantial challenges to the authorities in relation to providing adequate medical services for the local population, the immigrants and the expatriate Europeans. But it also presented significant opportunities for pharmaceutical entrepreneurs. Private businesses soon sprang up, but in the government hospitals the pharmaceutical needs of the settlement were recognised rather more slowly. Supplying medicines was seen as an essential element of medical services, which could nevertheless be undertaken by subordinate staff. Initially, such staff usually had to be recruited from India, where the need for medically trained personnel with pharmaceutical knowledge grew rapidly, and medical colleges were established to train subordinate staff; colleges were established in Calcutta and Madras in 1835, in Bombay in 1845 and in Lahore in 1860.[11]

Medical services and hospitals in the Straits Settlements

Initially the medical services available in the Straits Settlements were rudimentary. When Raffles arrived in Singapore in 1819 his seven ships had one medically qualified man between them. This was Sub-assistant Surgeon Thomas Prendergast; he was responsible not only for the health of the expedition, but also for the Medical Stores and Dispensary.

The headquarters of the Civil Medical Department of the Straits Settlements was in Penang, since

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Britain had had a presence there since 1786. Initially the resources available to the Government Medical Service were very modest. There was a Senior (or Superintending) Surgeon based in Penang, as the professional and administrative head of the Service; and an Assistant Surgeon at each of the three settlements. The man responsible for the medical care of the Singapore settlement was Assistant Surgeon William Montgomerie, who arrived with the second battalion of the regiment garrisoning Singapore in May 1819.[12] In 1832 the capital was transferred from Penang to Singapore, and in 1835 the headquarters of the Medical Department followed.[13]

In Singapore a hospital was soon needed, and one was built in the Cantonment for the troops. The first general hospital, or 'central pharmacy' as it was then called, was established two years later, in 1821. This supplied medical care mainly to Europeans; western medical services in the Straits Settlements were provided mainly for officials of the East India Company, British military personnel, sepoys and the local police; this situation continued up to the end of the nineteenth century.[14] In 1822 a second larger General Hospital was built to replace it; although a military hospital it began admitting sick sailors from the many ships calling at Singapore, as well as Europeans now living there. A separate Paupers Hospital was established for the care of the poor and destitute soon after Singapore was founded.

A third General Hospital had to be built in 1827 when the second one collapsed as a result of decay of the materials used in its construction. It was then put under civilian control. By then there were three people on the establishment: J Caswell, assistant surgeon; Joseph Powell, assistant apothecary (also employed in the Pauper Hospital); and John Leicester, hospital apprentice (also employed in the Pauper Hospital and the Medical Stores). These medical practitioners were assisted by a small number of medical subordinates in the performance of their duties. These were people who had usually obtained medical qualifications from the Indian Medical Colleges, who were seen as 'second class' doctors. They were treated as assistant doctors by the British.[15]

Supplying medicines in the hospitals

A strict hierarchy operated for medical officers in the service. British medical officers held ranks of assistant surgeon, surgeon and surgeon major. The most senior medical officer in the colony was the senior surgeon, who reported directly to the governor. The medical subordinates who supported the medical officers started as apprentices, initially became compounders or hospital dressers on completion of their apprenticeships, and finally could be appointed as sub-assistant surgeons, the highest rank they could attain. In April 1828 the medical department was re-organised; sub-assistant surgeons were henceforth to be known as apothecaries, with the next junior rank termed assistant apothecaries.[16] The title apothecary was thus a rank rather than a role.

Only Britons could be medical officers, whereas the medical subordinate ranks in the East India Company were open to both Britons and Indo-Britons (Eurasians).[17] Before long additional staff were needed to help run the hospital, and two new posts were approved. These were 'an assistant Apothecary who will visit the General Hospital with the Surgeon and have charge of the Medical Stores,' to be paid $40 per month, and 'a Native Compounder attached to this Department', who was paid $8 per month.

During this period when the Straits Settlements were administered as part of India, the Medical Service depended heavily on the Government of India for personnel to staff their hospitals and medical services. India was about 2,000 miles away, and it was very difficult to get replacements when vacancies arose as a result of death or ill-health. It was always difficult to get people to volunteer for service in the Settlements, as they were regarded as backward, and service there was regarded as a 'hardship posting.'[18]

The problem was particularly critical with regard to medical subordinates. Whilst one medical officer could supervise all the hospitals and medical services in a settlement, the actual work was done almost entirely by medical subordinates. To address this problem the senior surgeon proposed that local boys be trained for the medical department. He submitted a plan to the Governor on 28 August 1822 to recruit apprentices from the Penang Free School, to train them, and, when qualified to perform their duties, to appoint them as assistant apothecaries. In March 1823 the Senior Surgeon selected James Ash as the first person to be apprenticed in the Medical Department. Ash began his training as a Compounder, and several further apprentices were appointed.

The dawn of hospital pharmacy in the Straits Settlements

The role of the apothecary in the hospitals was clearly spelled out in regulations and covered a wide range of duties. In 1827 the apothecary in the general hospital was required 'to act also in the capacity of steward. Clothes and bedding etc. to be kept by him. He will be held accountable for their safety and preservation'. Both the apothecary and the apprentice were 'to live in the hospital compound. Both to be always present at the surgeon's visiting hours, and in no case both to be absent from the hospital at the same time'.[19] He also found himself in charge of the patients' diets. Separate charges existed for 'shipwrecked seamen or distressed British subjects' and others, and were spelled out in a letter from the Governor. 'For seamen sent in by the shipping ... one rupee for subsistence and medicine, and one rupee for the assistant surgeon in charge. In both cases, the diet is provided by the apothecary.'[20]

The duties of the assistant apothecary in Penang in 1830 were described in further regulations:

> He is placed in charge of the medicines at the Convict Hospital, from which the Native Pauper Hospital, Lunatic Asylum and Jails are also supplied. He has to

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attend to the Surgeon when he visits the hospitals, take down notes of any important case, register the prescriptions, see to the medicines compounded, superintend the Dressers, register the names, etc. of all the patients who come to hospital, enter their details and draw out returns for them all lastly. He must be a person who is able to maintain strict discipline in the hospitals, which is sometimes no easy matter, particularly in the Convict Hospital ...'[21]

The Straits Settlements became a convenient dumping ground for the transportation of convicts from India. Initially convicts were transported to Penang, but before long Singapore became the main port of disembarkation. Separate Convict Hospitals were established, and with that came the need for additional medical staff. However the journey by sea from India to the Straits was often a perilous one. This was not helped by the state of many of the English-built ships used for this journey. In 1847 the *Cleopatra* was despatched to Singapore with convicts, in company with six other ships. They met one of the worst cyclones on record, and neither she nor any of her complement of 151 sailors, her marine guard, nor any of the 150 convicts on board were ever seen again.[22]

Training apothecaries in the Straits Settlements

Despite some limited opportunities for advancement the local apprenticeship scheme was not a success. It was difficult to get boys to train for five years, and at the end of it the salary offered was very poor. Not surprisingly, some of the locally trained apothecaries left for private practice, and some threatened to resign if their salaries were not increased. In the 1830s only two more local apprentices were trained, Michael Allen in 1833 and Henry Lloyd in 1839. They and J I Woodford, a local boy trained as an apothecary in Penang in the 1820s who had been transferred to Singapore, were the only locally trained staff in Singapore. Ash was then in Penang.

Montgomerie, who had been promoted from assistant surgeon to senior surgeon in 1832, urged the Governor to more vigorously recruit locally rather than to keep sending people from India. Apothecaries from India would, he pointed out 'be comparatively inefficient from ignorance of the language, habits and customs of the native patients under treatment, some being natives of different parts of China, speaking many different dialects, Cochin-Chinese, Siamese, Burmese, Malays, Bugis and Javanese, besides the natives of the Malabar and Coromandel coasts.'[23]

But there were occasional successes amongst the locally trained apothecaries; some were dedicated and remained in the service. Oxley, who succeeded Montgomerie as senior surgeon in 1847,[24] noted in his first report on the hospitals for 1847/48 that 'the two immediately under my orders, apothecaries Allan and Lloyd, have given me entire satisfaction during the past twelve months. These two young men emulate each other in zeal and attention. Without the benefit of regular medical education, they have possessed themselves of a very thorough knowledge of pharmacy, are competent to manage fractures and wounds in emergency, and that with no mean skill and not without a considerable knowledge of the practice of medicine.'[25]

In February 1849 a pupil educated at the Singapore Institution (later the Raffles Institution) was selected as an apprentice. He served a three months' probationary period, after which the senior surgeon certified that he gave 'promise of industry and good conduct.' He was taken under the personal tuition of the surgeon 'for a few months longer for the purpose of becoming acquainted with the nature and properties of medicines.' The surgeon also recommended that he should receive his full allowance 'upon passing an examination in pharmacy at the end of the year.'[26]

Two years later Oxley sought to raise the salaries of apothecaries with a view to improving recruitment. Skills in pharmacy and in reading prescriptions were essential:

When they pass a satisfactory examination in pharmacy, show a general knowledge of medicine, the ability to read and write prescriptions, and acquaintance with the general routine of hospital duty, and can bleed and apply bandages in a skilful manner, I would raise their salary to 30 rupees a month.[27]

The pharmaceutical duties of the hospital apothecary

In 1852 new 'Rules and Regulations for Apprentices' were published. These set out what apprentices were expected to know after three years and five years of training respectively.

... Apprentices of 3 years' standing. ....will be expected to know how to read and write prescriptions in English, to determine the various medicines by sight, and to be able to tell their doses and qualities, as far as whether they belong to the class of purgatives, emetics, diuretics, etc. ... The passed apprentice (after 5 years) will be expected to have a thorough knowledge of materia medica, to know the components and proportions of all the official preparations, [and] to be able to tell the effects and the doses in which they are given ...

As the workload grew the need to increase the establishment became clear. In June 1850 an application was made to Bengal for an assistant apothecary and a second dresser for Tan Tock Sing's hospital, which had originally been the Pauper Hospital founded in 1822. The reply was received some nine months later, saying that it was difficult to make suitable appointments to the hospital. The services of Mr Christopher Doyle, a senior hospital apprentice, were eventually offered as assistant apothecary, but he would only be able to take up his appointment once he was 'relieved of the duties which he is at present performing with Her Majesty's 80th regiment at Darjeeling.'[28]

Although small numbers of locally recruited young men continued to be trained as apprentices during the 1840s and 1850s the numbers were never sufficient; demands would have to continue to be made on the authorities in India. On 1st June 1860 the Governor, Cavanagh, reported to the Government of India that the apprenticeship scheme in the Straits Settlements had proved an utter failure, and that:

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we shall in a great measure continue to be dependent for assistant apothecaries to fill any vacancies that may occur from the medical establishment either at Madras or Bengal.[29]

The dawn of retail pharmacy in the Straits Settlements

The opening of the first chemists' shops in the Straits Settlements occurred within a few short years of Raffles' arrival in Singapore. One of the earliest dispensaries was owned by Jose Almeida, a former surgeon on a Portuguese warship. He had settled in Singapore in 1825 as a medical practitioner, and he opened a dispensary on the site of the godown (or warehouse) of Guthrie and Co. The opportunity to start his business occurred when some Spanish and Portuguese vessels got caught in the harbour during a monsoon, and they had to sell their cargo of medicines and related products.[30]

The early Singapore dispensaries were set up to cater for the needs of European troops and traders. They were mainly located along Battery Road (Fig. 2) and Commercial Square (now Raffles Place), where the godowns and companies owned by Europeans were concentrated. One was owned by JI Woodford, the local boy who had trained as an apothecary in Penang in the 1820s. When he left the government's service, he started the Kanpong Glam Dispensary in Singapore. He was listed as a 'chemist and druggist' in the 1864 Singapore Directory. Woodford advertised that 'medical prescriptions will meet with prompt and careful attention at all times. Medical chests can be filled up and supplied on short notice, and at moderate rates.' Woodford had a partner, Leonard Scheeder, in 1861, and he renamed his dispensary the New Dispensary, with Henry Woodford (Woodford's son) as dispenser.

Figure 2. 'Medical Hall': Early retail pharmacy on Battery Road, Singapore.

By the time of the publication of the first edition of *The Straits Times and Singapore Journal of Commerce* on 15 July 1845 (Fig. 3) there was already strong evidence of substantial pharmaceutical activity. An advertisement appeared on the front page


THE
STRAITS TIMES.
AND SINGAPORE JOURNAL OF COMMERCE.
VOL. 1ST. TUESDAY MORNING JULY 15TH, 1845. NO. 1.
NOTICE TO ADVERTIZERS
FOR BATAVIA.
TO BE LET.
SINGAPORE DISPENSARY.

Figure 3. Advertisement for 'Singapore Dispensary': *The Straits Times,* 15 July 1845.

under the heading 'Singapore Dispensary.' Two surgeons, R Little and T J Martin, declared that 'in consequence of the establishment of a government hospital, the undersigned have given up the Private Hospital attached to the above dispensary.' They offered their services to the owners and masters of vessels, stating that 'they, their passengers and crew can be attended at any hour of the day or night.' Furthermore,

> the dispensary is open for the sale of medicines and the answering of prescriptions from 9am to 5pm daily. Medicine chests are fitted up with the requisite medicines, and directions for a tropical climate, while particular medicines with their directions can be supplied [to] those visiting countries subject to peculiar endemics.[31]

By 1847 Little and Martin were included in the list of chemists and druggists. The 1845 advertisement stated that 'Mr Little is resident on the premises, Commercial Square,' although this does not appear to have continued for long. Later directories listed the resident dispenser as R Tucker in 1850, Thompson in 1851, Robert Jamie (manager and dispenser) in 1861.

The emerging retail pharmacy trade faced stiff competition from the medical profession, who continued to supply medicines and replenish medicine chests. A Dr W Maney of the Central Dispensary advertised that he was willing to visit the homes of parents and guardians to vaccinate children, and also that medicine chests were replenished.[32] Most of the private doctors in the Settlements did their own dispensing, or else had a dispenser or unqualified assistant. Dr J Scott of the Straits Dispensary employed a William Neil as his dispenser.

At this time there was no control over advertisements for medicines, or for medical services offered in Singapore. Both Woodford and Martin and Little advertised the sale of patent medicines. Products were imported from Britain and elsewhere. The front page of the first edition of *The Straits Times* in 1845 included advertisements for Holloway's Pills and Holloway's Ointment (Fig. 4). Competition also

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HOLLOWAY'S OINTMENT

EXTRAORDINARY CURE.

OF A CASE ABANDONED BY GUY'S, THE METROPOLITAN, KING'S COLLGE, AND CHARING CROSS HOSPITALS, LONDON.

THIS AFFIDAVIT WAS SWORN TO BEFORE THE LORD MAYOR OF LONDON

WILLIAM BROOKE of No. 2, Union Street, Southwark, London, Messenger, maketh, Oathsaith that he (this deponent) was afflicted with FIFTEEN RUNNING ULCERS on his left Arm, and Ulcerated Sores and Wounds on both Legs, for which the deponent was admitted an out-door patient at the METROPOLITAN HOSPITAL, in April, 1841, where he continued nearly Four Weeks. Unable to receive a Cure there.

THE DEPONENT; sought relief at the three following Hospitals,—KING'S COLLEGE HOSPITAL, in May, for Five Weeks, at GUY'S HOSPITAL, in July, for Six Weeks, and at CHARING CROSS HOSPITAL at the end August, for some weeks more; which the deponent left, in a far worse condition than that in which he had quitted GUY'S when SIR BRANSBY COOPER, and other medical officers of the Establishment, had told the oponent *"that the only chance of saving his life was to Lose his Arm."*

THE DEPONENT thereupon, called on Dr. BRIGHT, chief Physician of Guy's who, on viewing the deponent's condition, kindly and liberally said, *"I am utterly at a loss what to do for you, but here is a half sovereign, go to Mr. Holloway, and try what effect his Pills and Ointment will have, as I have frequently witnessed the Wonderful Effects they have in Desperate Cases! You can let me see you again."*

THIS UNPREJUDICED advice was followed by the deponent, and a PERFECT CURE was EFFECTED in THREE WEEKS, by the use of Holloway's Pills and Ointment, after THREE HOSPITALS had failed! When Dr. BRIGHT was shewn, by the deponent, the result of his advice and charity, he said—"I am both astonished and delighted! for I thought, that if ever I saw you again, it would be without your Arm—I can only compare this Cure to a Charm!"

Sworn at the Mansion House of the City of London, this 8th day of March, 1842) WM. BROOKE.

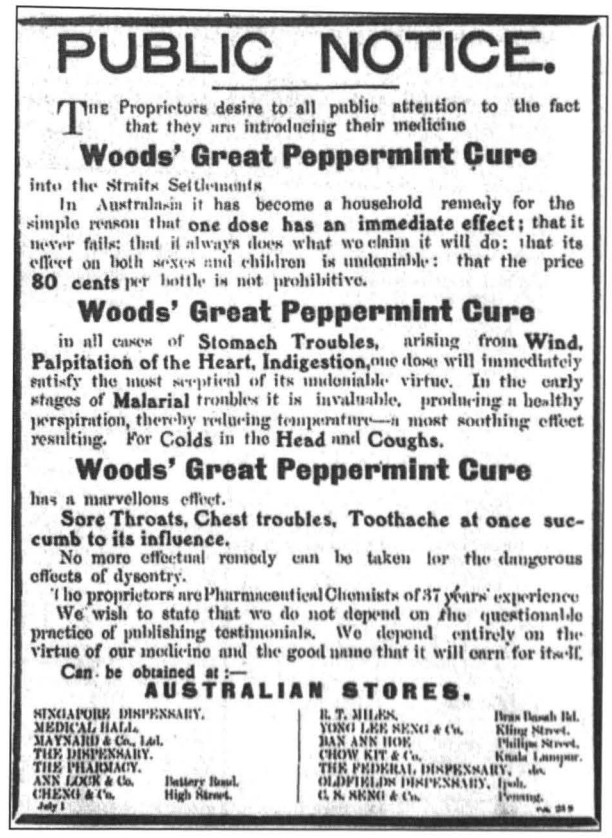
Before me JOH. PRICE, MAYOR

This extraordinary Ointment will cure the most Dangerous Wounds and Ulcers, Bad Legs, Bad Breasts, Sore Nipples, Sore Throats, Chiego-foots, Yaws and Cocoa-Bay, or AFRICAN KING'S EVIL

Figure 4. Advertisement for 'Holloway's Ointment': *The Straits Times,* 15 July 1845.

came from Australian manufacturers. 'Woods' Great Peppermint Cure' was advertised in *The Straits Times* listing all the 'Australian stores' where it could be obtained (Fig. 5). The proprietors attempted to distinguish themselves from their British rivals:

> We wish to state that we do not depend on the questionable practice of publishing testimonials. We depend entirely on the virtue of our medicine and the good name that it will earn for itself.[33]



PUBLIC NOTICE.

THE Proprietors desire to all public attention to the fact that they are introducing their medicine

Woods' Great Peppermint Cure

into the Straits Settlements

In Australasia it has become a household remedy for the simple reason that **one dose has an immediate effect**; that it never fails: that it always does what we claim it will do: that its effect on both sexes and children is undeniable: that the price **80 cents** per bottle is not prohibitive.

Woods' Great Peppermint Cure

in all cases of **Stomach Troubles**, arising from **Wind, Palpitation of the Heart, Indigestion**, one dose will immediately satisfy the most sceptical of its undeniable virtue. In the early stages of **Malarial** troubles it is invaluable, producing a healthy perspiration, thereby reducing temperature—a most soothing effect resulting. For **Colds** in the **Head** and **Coughs**.

Woods' Great Peppermint Cure

has a marvellous effect.

Sore Throats, Chest troubles, Toothache at once succumb to its influence.

No more effectual remedy can be taken for the dangerous effects of dysentry.

The proprietors are Pharmaceutical Chemists of 37 years' experience

We wish to state that we do not depend on the questionable practice of publishing testimonials. We depend entirely on the virtue of our medicine and the good name that it will earn for itself.

Can be obtained at :—

AUSTRALIAN STORES.

SINGAPORE DISPENSARY.		B. T. MILES.	Bras Basah Rd.
MEDICAL HALL.		YONG LEE SENG & Co.	Kling Street.
MAYNARD & Co., Ltd.		BAN ANN HOE	Philips Street.
THE DISPENSARY.		CHOW KIT & Co.	Kuala Lumpur.
THE PHARMACY.		THE FEDERAL DISPENSARY,	do.
ANN LOCK & Co.	Battery Road.	OLDFIELDS DISPENSARY,	Ipoh.
CHENG & Co.	High Street.	G. S. SENG & Co.	Penang.

July 1 ow. 319

Figure 5. Advertisement for 'Woods Great Peppermint Cure': *The Straits Times,* 15 July 1845

Whilst the retail pharmacies stocked mainly European medicines, local medicines and those imported from a range of countries including China, India and Malaya were available from market stalls and other outlets. These were known as Bazar medicines. From the earliest days of the colony both European and Bazar medicines were available in the hospitals. Orders to medical officers from the East India Company noted:

> to seamen of private ships and other private European individuals, the medical officer in charge to furnish provisions and Europe and Bazar medicines and other necessaries at the above rate.[34]

Understanding about the various drugs in use must have been quite a challenge for those involved in their supply. Before the first edition of the *British Pharmacopoeia was* published in 1864, those in India generally relied on the *London Pharmacopoeia.* In Singapore they relied on books obtained from India.

The senior surgeon also requested the officiating governor to obtain elementary medical books from the medical college at Calcutta, viz. *The Pupil's Pharmacopoeia* or the *Bengal Pharmacopoeia and Dispensatory.*[35]

Treating smallpox and cholera

For the prevention of certain diseases, particularly smallpox, vaccination was already established. In Singapore the job of smallpox vaccinator was added

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to the role of apothecary in 1836. The medical board agreed the appointment of

> one apothecary, assistant apothecary or other properly qualified person acting as vaccinator at Singapore, to have 20 rupees per month as long as the genuine vaccine virus is kept up.[36]

Penang and Malacca had to manage with one or two vaccinators respectively. However, the vaccination campaign was not a success, and an epidemic broke out amongst the native population in early 1838. It was attributed to the native population's prejudice against vaccination.

Smallpox was just one of the serious diseases affecting the inhabitants of the Straits Settlements. Cholera too had a devastating effect. The Settlements' close association with Bengal and its location on the busy sea route through the Straits of Malacca meant that it could not easily escape the various pandemics that occurred in the early nineteenth century. The first started in India in 1817 and had spread across Asia by 1825; a second started in 1826 and continued to 1832; a third started in 1840 and continued to 1849; and the fourth pandemic started in 1863 and ended in 1866.[37] They provided good business for chemists and druggists.

In 1818 the standard treatment for cholera in the region, according to assistant surgeon Frederick Corbyn, who was in charge of a native field hospital in an epidemic area of India, was 'calomel gr.3 and opium gr. ¼ two hourly, with frequent drafts of brandy and water and other stimulants.' This proved ineffective and was quickly modified. The next 110 patients were treated rather more heroically: 'calomel gr.15 which I dropped on the tongue and washed down with 60 drops of laudanum and 20 drops of peppermint in 2 ounces of water.' Only two of these patients died. It was claimed that the treatment

> removed the irritability and spasm, composed the stomach and bowels, produced sleep and tranquillity of the mind, excited the secretion of the liver, and prevented the progress of inflammation.[38]

There were no recorded instances of epidemic outbreaks in the Straits Settlements during the second cholera pandemic, although a degree of panic set in as a result of accounts of 'dreadful ravages' in India and Europe. Local newspapers offered their own helpful advice. In 1832 *The Singapore Chronicle* published a treatment for cholera that was in vogue in India. A special mixture was made by dissolving 8 ounces of Bazar Sal Ammoniac and 8 ounces of unslaked lime in one quart of boiling water. It was decanted after three days. Three drachms of the mixture were then diluted with three times the quantity of water, and a few drops of peppermint essence added. It was supposed to have cured 165 out of 171 patients in one outbreak.[39] This treatment was notable for its absence of opium.

The method of Major Wallace was recommended in *The Singapore Free Press*. It consisted of '2 teaspoonful of strong decoction of cloves, cinnamon and spice, 1 teaspoonful of red pepper, 1 teaspoonful of black pepper, and 60 drops of laudanum.' These ingredients were to be

> put in a large claret glass, which fill two-thirds full of brandy or arrack, then add boiling hot water sufficient to make the dose as hot as a patient can conveniently take it. One half of the above dose to be given, and if retained no more will be required. Some grated nutmeg may be added. The greatest care will be necessary in purging the patient with castor oil.[40]

This may not have done much for the cholera but patients would no doubt have got some relief from the laudanum.

Treating other diseases

Despite the public concern about smallpox and cholera, for many years the four main causes of death in Singapore were in fact tuberculosis, malaria, dysentery and beriberi. Plague epidemics were not recorded before 1894. By the 1840s immigration had risen steeply, with around 10,000 people arriving every year.[41] Other diseases such as leprosy also became significant, as did mental health problems.

Leprosy was a crippling disease and there was little in the apothecary's arsenal that could help. In 1846 a wooden shed was built to house paupers, and amongst the 146 inmates were 'ten lepers whose ghostly appearance struck terror into the minds of every beholder.' The incidence increased rapidly, with the senior surgeon, Oxley, noting in his annual report of 1847/48 that 'there were 30 more or less affected by the complaint.' He did not think the disease particularly contagious, but concluded 'it would appear to me a wise precaution to segregate these men and make them live apart from the general body.'[42]

Mental health problems became an issue early in the life of the settlements. In May 1825 a committee investigating the state of convicts reported that 'a mad house in which there are now 22 lunatics including only one convict is situated in the vicinity of the Country Lines.'[43] Within twenty years the number had grown considerably, and moves were made to improve the 'lot of the lunatics by putting a medically qualified person, assistant apothecary Henry Lloyd, in charge of the lunatic asylum.'[44]

Dental problems were another source of revenue for the private druggist. They appear to have done good business in imported products including Brande's Enamel and Brande's Tooth Powder. In December 1848 a GR Wythen Baxter wrote that

> having had a hollow tooth of some years standing ... I by chance, a few weeks back, purchased of my Newtown druggist (Mr Moore) a box of your valuable enamel, and subsequently I have not been distressed with that tearing, tormenting ache of pains, the toothache.[45]

Other popular items were 'Gabriel's Celebrated Odontalgue' for restoring and preserving the teeth, their 'patent white enamel for stopping front teeth' at 5s. and 10s. 6d. per packet, and gutta percha at 1s. 6d.per box.

Opium in the Straits Settlements

Opium was as ever a staple of the apothecary's arsenal, although in the Straits Settlements it was available everywhere. For hospital officials trying to control the demand the situation was exacerbated by the extent of

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daily use amongst the locals. In a letter to the senior surgeon in 1857 the Governor noted that

> opium was never prescribed except as a medicine for the diseased paupers, who reached the hospital in a state of exhaustion from the want of opium, and that to save their lives this drug had to be administered and reduced gradually.[46]

Nevertheless the sheer number of patients addicted to smoking opium in the form of 'chandoo' meant that the quantity of opium required by the hospital was substantial. Arguments broke out about the best way to administer it, whether orally or by smoking. Opium smoking was

> the general way the Chinese consume the drug, and medicinally is the most efficacious ... medical men in this settlement have found that when administered either as a solution or in the form of a tincture, it does not answer so well as when inhaled into the lungs.

In August 1857 the Governor asked the senior surgeon whether 'the amount of opium consumed in the hospital could be considerably reduced.' The senior surgeon refused.

> I have no hesitation in saying its use in the miserable creatures treated in this hospital is indispensable. If it is withheld or not given in sufficient quantity, an exhausting diarrhoea sets in with entire loss of appetite ... I do not think the supply can with propriety be reduced.[47]

The amount of opium used in the hospital continued to be large.

Export of drugs from the Straits Settlements

The flow of medicines between the Straits Settlements and elsewhere was not entirely one way. The Settlements were themselves the source of a number of useful drugs. The spice islands in the Straits of Malacca were well known as the source of valuable spices well before the British arrived. The early British administrators encouraged the growth of cash crops, and introduced a number of crops including nutmeg, clove and pepper. The nutmeg tree, *Myristica fragrans,* was originally indigenous to the Molucca Islands and a few neighbouring islands, along with north western New Guinea, but it was slowly introduced into Penang, Sumatra, Malacca and Java, as well as the West Indies and Ceylon. Nutmegs and mace were exported in substantial quantities from both the Malay Archipeligo and the Straits Settlements. It was probably introduced into Europe during the twelfth century.[48]

There were differences in the nutmegs cultivated even between the different spice islands, resulting in differences in the prices paid at the wholesale markets. Nutmegs were grown in both Singapore and Penang; the Penang nutmegs were described as 'broadly ovoid and very aromatic,' whereas Singapore nutmegs were 'more deeply and minutely wrinkled and frequently show marks of scorching.' As well as their use as a spice, nutmegs were extensively used in medicine. They had stimulant and carminative properties, although large doses had to be avoided because the principal ingredient, myristicin, is toxic. The volatile oils expressed from the nutmeg have also been used externally in chronic rheumatism.

Another important pharmaceutical product exported from the Straits Settlements was benzoin. Its principal source was in fact Sumatra, the main island across the Straits of Malacca, where *Styrax benzoin* trees were both indigenous and cultivated. Benzoin is produced following the infliction of injury to the tree. Two distinct varieties of benzoin from Sumatra were known under the name Penang benzoin. The first was generally known as storax-benzoin, and is said to have a very agreeable odour resembling storax; the second was usually known as either 'glassy Penang' or simply as 'Penang benzoin'. It was distinguished by its glistening glassy fracture, and its slight odour.[49]

Benzoin had a wide range of medicinal uses. The most valued variety for medicinal purposes was Sumatra benzoin. It was taken internally for its action as a carminative, expectorant and diuretic, and was applied externally for its stimulant and antiseptic actions. Other varieties of benzoin were also produced in Sumatra. Palembang benzoin, which was not official, differed markedly in appearance from the other forms, and was used mainly for the preparation of benzoic acid.

Yet another important export from the Straits Settlements was gutta percha, from a genus of tropical trees (*Palaquium*) native to Southeast Asia and northern Australasia, from Taiwan south to the Malay Peninsula and east to the Solomon Islands. It grew well in Singapore and the surrounding regions. The term gutta percha was also used to describe the inelastic natural latex produced from the sap of these trees, particularly from the species *Palaquium gutta*. The word 'gutta-percha' comes from the plant's name in Malay, *getah perca*, which translates as 'percha sap'. In 1843 William Montgomerie recommended to his superiors at the Bengal Medical Board that it should be used for surgical purposes.

It was in regular use in Singapore by 1845. Oxley (who had replaced Montgomerie as Senior Surgeon in 1847) referred to a formula of Mr Little: 'a good cement for luting bottles and other purposes is found by boiling together equal parts of gutta, coal tar and resin', suggesting a modification using two parts of gutta instead.[50] News of the new product soon reached Britain. In 1847 Montgomerie demonstrated it to the Royal Society of Arts in London, illustrating the materials' ability to be heated and moulded. The Royal Society awarded him a gold medal for his discovery. By 1848 Edwin Truman, dentist to Queen Victoria, had introduced it as a base for artificial dentures.

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Life for the British expatriate chemists and druggists

After the initial period of rapid and frequently chaotic development, life for the few expatriate British chemists and druggists soon settled into a comfortable and orderly pattern. The steamship speeded up commercial activity and produced marked social changes in the growing British community. Some of the British expatriates could afford periodic returns to England, and all could retain links with home through up-to-date newspapers, regular letters and new books. A more formal middle-class society emerged in the Straits Settlements, reflecting the values of mid-Victorian Britain. But the arrival of steamships also brought greater pressure for office work; visitors complained that their compatriots were too busy making money to welcome strangers.

The European community also drew increasingly apart from the Asian community. At the official level there were multiracial dinners, balls and celebrations. But people increasingly tended to relax amongst their own community. Western entertainments such as amateur theatricals developed, and clubs were formed. A cricket club was established in 1852, and a swimming club in 1866. There was however a growing gulf between the way of life of prosperous Asians and the mass of the population.[51]

Epilogue

The administration of the Straits Settlements as an outpost of British India meant that they were highly vulnerable to events in India itself. The status of the Settlements changed following the Indian mutiny in 1857. The nominal control of the British East India Company ended, and the Straits Settlements were subordinated to British India. They were then subject to direct rule by the British Government, administered through the India Office in London. On 1st April 1867 responsibility for the Straits Settlements transferred from the India Office to the Colonial Office, at which point it became a Crown Colony with its own Legislative Council. It retained this status until the Japanese occupation in 1942.

After 1867 pharmacy continued to develop slowly, taking account of developments in both Britain and India. But, whilst in Great Britain the apothecary increasingly took on the role of general medical practitioner and those employed in hospitals were replaced by chemists and druggists, in the Straits Settlements the apothecary took on more and more medical and surgical duties, as it became more difficult to recruit either physicians or surgeons. The local newspaper, the *Straits Times*, lamented in 1869 that:

> Our hospitals are left too much to the control of the apothecaries. In scarcely any part of the civilised world will hospitals be found without resident physicians or surgeons or both.[52]

In the Straits Settlements the apothecary originally emerged as a medical subordinate supporting the surgeon. But by 1869, with the increasing burden of medical and surgical activities, the dispensing of medicines was normally delegated by the apothecary to others. *The Daily Times* reported that

> The apothecary in charge has apprentices as assistants, whose duty we suppose it is to aid in compounding and administering the medicines etc.[53]

So in both Britain and the Straits Settlements the apothecary increasingly abandoned any pharmaceutical activity, but there were important differences. In Britain they moved to be general medical practitioners, and in the Straits Settlements to be physicians and surgeons; in Britain pharmaceutical activities were taken on mainly by chemists and druggists; in the Straits Settlements they were taken on mainly by unqualified assistants.

The organisation of a pharmaceutical body in the Straits Settlements therefore took rather longer than it did in Britain. The first law for the registration of pharmacists was the Straits Settlements Registration of Pharmacists Ordinance passed in 1903. A Straits Pharmaceutical Association was formed on 18 August 1905. Morphine and Poisons Ordinances were passed in 1904 and 1905 which restricted all unqualified men from prescribing preparations containing opium or morphine. In 1905 the King Edward VII Medical School was opened, and was immediately given responsibility for preparing and examining candidates for the Pharmacy Certificate.[54] The declared aims of the Association were:

> To protect and further the interests of pharmacy in general and the members of the Society in particular; and to encourage and to further the advancement of pharmacy and pharmaceutical education.

Membership of the Association was however open only to members of the Pharmaceutical Society of Great Britain. The ten pioneer members were all European. The first president was a Mr J Mackenzie, who remained in office for several years. A Register of Pharmacists in Singapore was first opened on 22 May 1935. The first batches of local pharmacists qualified in March 1936 and March 1937 respectively. The constitution of the Straits Pharmaceutical Association was amended towards the end of 1937 in order to permit all registered pharmacists to become members.[55]

The early years of pharmacy in the Straits Settlements went through a process that was to be repeated in many other new colonies. The person responsible for medicines initially was usually a ship's surgeon. This generally transferred to military surgeons on land, and the role was soon delegated to subordinates, often apothecaries or apothecaries assistants. As the apothecaries took on increasingly medical roles responsibility for medicines passed first to chemists and druggists and later to pharmacists.

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The range of drugs used usually progressed from mainly European medicines to a mixture of European and local drugs, and eventually to an eclectic mix reflecting the diversity of the population. Trade in pharmaceutical commodities expanded rapidly, although in the case of the Straits Settlements the export trade in nutmegs and benzoin soon became eclipsed by other exports, particularly those of the tin-mining and rubber-planting industries.[56]

This brief account of the early history of pharmacy in the Straits Settlements thus illustrates many of the difficulties and challenges faced by the early pioneers of pharmacy in the outposts of Empire: and demonstrates how social, economic and cultural factors all played important parts in shaping practice locally.

Author's address: Stuart.Anderson@lshtm.ac.uk

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Continued from p. 46 **Pharmaceutical Industry**

Some interesting observations can be made from the profiles provided by Singh. For example, three of the seven men profiled were not Indian nationals; they include one Englishman, one Iranian and one Greek. Most received their pharmaceutical education outside of India, and in fact most had higher qualifications, including some doctorates. Indeed, many received much of their higher education in Britain; Ray gained a DSc from Edinburgh in 1888, Gajjar an MA in chemistry in 1884, Nanji a PhD from London in 1932, and Mody an MSc from London. Most were specialists in pharmaceutical chemistry.

Because the focus is on pioneers during the Raj there are some obvious omissions from the list of companies covered. No mention is made of the origins of two of the largest Indian pharmaceutical manufacturers today, Rambaxy and Dr Reddy's Laboratories. And the same can be said of other large companies, all with turnovers exceeding US $0.5 billion, including Lupin Ltd, Aurobindo Pharma, Dabur, Sun Pharmaceuticals, Cadila Healthcare and Jubilant Lifesciences. Likewise little reference is made to the rise of the transnational pharmaceutical corporations. Yet most are long-established in India and represent significant players amongst Indian pharmaceutical companies; GlaxoSmithKline Pharmaceuticals, Sterling Bio and Aventis Pharma all have turnovers in India of between US $250 and 500 million.

What brought about the transformation of the Indian pharmaceutical industry in the middle of the twentieth century was in fact India's response to patent protection. British India was subject to patent laws dating back to 1856. On independence India inherited the Patents and Design Act of 1911, which provided product patent protection for pharmaceuticals for 14 years. India passed its own Patents Act in 1970, which provided process but not product protection for pharmaceuticals for up to 7 years. This resulted in an upsurge in process innovation, with companies able to ignore product patents whilst recognising process patents.

The subsequent history of the pharmaceutical industry in India is a complex one, with India joining the World Trade Organisation in 1995 and signing up to the requirements of the WTO intellectual property rights agreement, TRIPS. It was given 10 years (until 2005) to comply with product patents as well as process patents. But by that time the industry had developed great expertise, it had increased dramatically in size, and it had become the important world player that it is today.

The full history of the Indian pharmaceutical industry has yet to be written, but with this book Singh has made a small but useful contribution to fulfilling this aim.

Dr Stuart Anderson

Major Accessions to Repositories in 2011 Relating to Pharmacy and Chemistry

(Provided by National Archives)

Bedfordshire and Luton Archives and Records Service, Riverside Building, Borough Hall, Cauldwell Street, Bedford MK42 9AP: Lloyds Pharmacy and predecessors, Leighton Buzzard: prescription books 1856-1994 (X970); Royal Pharmaceutical Society of Great Britain, Bedfordshire branch: further papers 1933-2011 (X963).

Derbyshire Record Office, New Street, Matlock, Derbyshire DE4 3FE: Finlay McKinlay, wholesale and retail chemists, Glossop: accounts 1904-1959 (D7445); Chemist and druggist, Cromford: prescription and dispensing books c1862-1950 (D7525).

Hertfordshire Archives and Local Studies, CHR002, County Hall, Pegs Lane, Hertford SG13 8EJ: MW Bush, chemist and antiques dealer, Sawbridgeworth: business papers incl rel to Quinneys Antiques 1930-1979 (DAcc 1294).

Leicestershire, Leicester and Rutland, Record Office for, Long Street, Wigston Magna, Leicester LE18 2AH: James Attenburow, druggist, Melton Mowbray: notebook containing memoranda, financial calculations and receipts c1850-1859 (DE8179).

Manchester Archives and Local Studies, 56 Marshall Street, New Cross, Manchester M3 3WD: Pritchards Ltd, chemists, Manchester: recipe books and financial records 1860-86 (M375).

Peterborough Archives, Peterborough Central Library, Broadway, Peterborough PE1 1RX: Peterborough Chemists Association and Peterborough Pharmaceutical Society: minutes, photographs and menu cards 1914-1972 (Accession no: 2011/24).

Plymouth and West Devon Record Office, Unit 3, Clare Place, Coxside, Plymouth, Devon PL4 0JW: Cookworthy & Co, wholesale chemists and druggists, Plymouth: chemical and druggist account book, druggists receipt and recipe books rel to distilling, incl recipes for gin, incl Plymouth Gin, Dutch Spirit, brandy, and peppermint 1811-1842 (3817).

Scottish Borders Archive and Local History Centre, Heritage Hub, Kirkstile Hawick Roxburghshire TD9 0AE: Keith Holme, pharmaceutical chemists, Galashiels: ledgers, prescription books 1880-1952 (A/11/36).

Somerset Heritage Centre, Brunel Way, Norton Fitzwarren, Taunton, Somerset TA2 6SF: Records rel to Clevedon incl ledger for unknown grocer's shop, pharmacy ledgers, notes of Clevedon Heritage Centre, Community Centre minute books, diaries of an unknown person 1817-2001 (A\CDR).

Wellcome Library, Archives and Manuscripts Section, 183 Euston Road, London NW1 2BE: British Pharmacological Society: additional records incl minutes, project and subject files, awards, membership, education and public relations c1940-2011 (SA/BPS); Samuel Glass, apothecary doctor: casebook (attributed) with 20th cent transcript c. 1700-1799 (MS.8768-8769).

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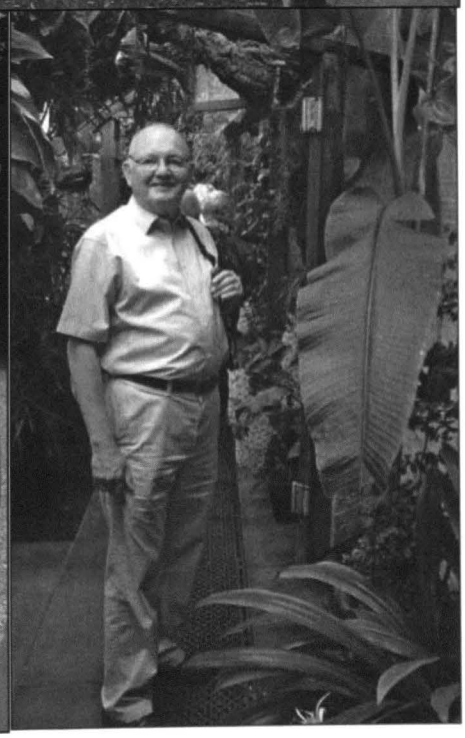
BSHP Visit to Chelsea Physic Garden, June 2012

Prof. Peter Houghton, Kings College London leading a guided tour of the gardens.

Photos: Susan Kirby, Peter Homan.



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BSHP Annual Spring Conference 2013

CALL FOR PAPERS

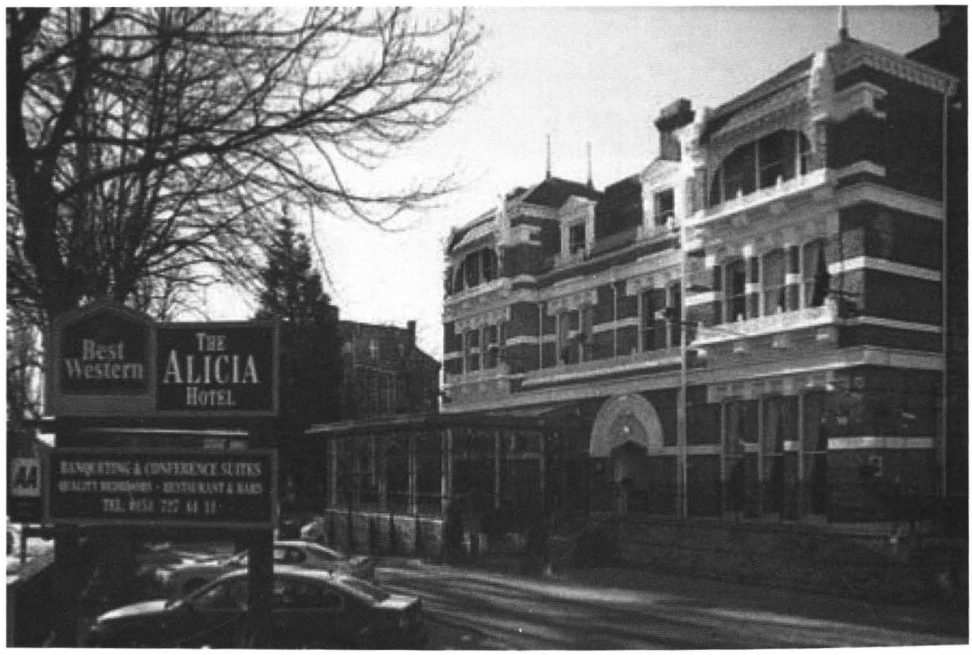
The annual conference 2013 will be held from Friday March 22nd to Sunday March 24th at the Best Western Alicia Hotel, 3 Aigburth Drive, Liverpool, Merseyside, L17 3AA.

The price is being held at last year's level of £300 all in.

The hotel is situated in the tranquil area of Sefton Park yet only minutes by car from the city centre, and Saturday afternoon will be free for you to explore the World Heritage Site or the park.

Taking our cue from Liverpool itself with its wide connections as an international port we are proposing that the theme for this conference should be trade or the sea. Contributions on any topic welcome but if we are oversubscribed papers with a link, however tenuous, to our venue will be given priority. Presenters are usually given 25 minutes which should include time for questions.

If you would like to present a paper please let Shirley Ellis have a preliminary title by the end of October. If you have a longer paper which is of particular relevance to Liverpool please contact her to discuss timing.



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A Youthful Collaboration for BSHP

Following a successful venture to interest students in the history of pharmacy back in 2009 the British Society for the History of Pharmacy held a joint meeting at the University of Huddersfield for the first time on November 1st 2012.

Over 100 attendees enjoyed a buffet supper and then filled the George Buckley lecture theatre to hear a presentation by Dr Pat Cullum entitled 'Hospitals and Medicine in the Middle Ages'. Dr Cullum is head of history at the University but had not worked with her pharmacy colleagues prior to this event. Pharmacy and history staff are now hoping that this venture is just the start of a friendship and collaboration between the he two subject areas, who share the same building on the university campus but had not previously identified common areas.

Dr Cullum is an expert in early medicine and she gave an enthralling account of the development of hospitals and theories of therapeutics from the 12th – 15th centuries amongst which she cleverly described the emergence of early 'pharmacists'. While much of her talk was of the unfamiliar but intriguing history of medicine, many members of the audience were enchanted by some of her revelations such as descriptions of the influences of different cultures and the origins of the familiar shapes of drug jars.

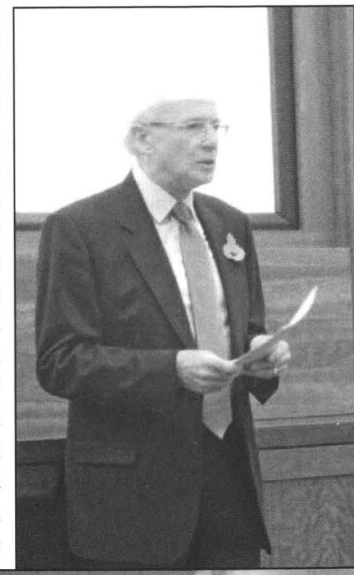
The number of attendees, on such a cold evening, indicates that the fascination of pharmacists and pharmacy students with the history of their profession is alive and well – at least in this part of Yorkshire! The meeting attracted BSHP members from as far afield as Bath and Surrey, LPF members from all of West Yorkshire and all sectors of the profession, students from neighbouring Bradford University and a healthy delegation of Huddersfield pharmacy staff, students and recent graduates, some of whom had undertaken considerable journeys to attend. Those who had travelled the furthest were four pharmacy undergraduates from Wilkes, Pennsylvania, USA who were on an exchange visit to Huddersfield and had no previous experience of this sort of event and were thrilled to be able to take part.

A lively question and answer session followed the presentation and many guests expressed a hope that there might be more evening lectures of a similar nature as the event had been so successful in bringing together pharmacists and future pharmacists from such a broad range of backgrounds. Students, in particular, commented that it was a really enjoyable evening and had helped them to feel engaged with the profession.

The evening was introduced by Trevor Whaley, president of the BSHP, and the vote of thanks to Dr Cullum proposed by Dr Gill Hawksworth, Chair of the LPF and Senior Lecturer at the University of Huddersfield.

The University of Huddersfield is proud to have hosted this event and looks forward to working with BSHP again in the near future. Perhaps amongst the audience there were just a few future pharmaceutical historians?

Dr Margaret S Culshaw
Deputy Head of Pharmacy, University of Huddersfield



Joint meeting at Huddersfield University, 1st November 2012.
Left: BHP President Trevor Whaley;
below, left: Dr Pat Cullum, head of history;
Below right: The audience in the George Buckley Lecture Theatre at the Queensgate Campus.

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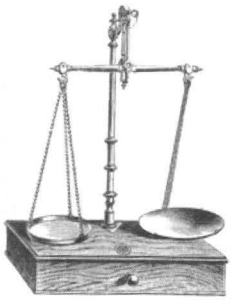

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Contents

Diary

Please note that evening meetings will be held at the RPS, 1 Lambeth High Street, on Mondays, starting with refreshments at 5.00 pm, unless otherwise stated.

Monday 11 February 2013
'The Materia Medica of the English Monastic Pharmacopoeia: How much do we really know?' by Julie Wakefield. Lambeth, 5.30pm.

Tuesday 21 May 2013
'Reflections of a Regulator' by Sir Michael Rawlins. Joint Meeting with Society of Apothecaries at Apothecaries Hall. Details for booking later.

Future dates

June 2013 Visit to be confirmed.

Monday 7 October2013 to be confirmed.

November 2013 to be confirmed.

British Society for the History of Medicine
28 to 31 August 2013 24th Congress at Christ Church University, Canterbury, Kent.

Facebook
You can find BSHP by searching for "British Society for the History of Pharmacy" once you have logged into Facebook.

BSHP Annual Spring Conference

Friday 22 March to Sunday 24 March 2013

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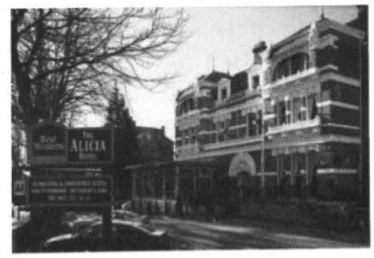

Best Western Alicia Hotel, Liverpool

International Society for the History of Pharmacy

41st Congress for the History of Pharmacy, Paris,
The 41st Congress will be held from Tuesday 10 to Saturday 14 September 2013 at the Couvent des Cordeliers, Paris.
The two main themes will be the history of the history of pharmacy itself, celebrating the centenary year of la Société d'Histoire de la Pharmacie, and the bicentenary of the death of the military pharmacist Antoine Augustin Parmentier, well known for his researches on nutrition and hygiene.
Details will be available on the website later: http://www.41ichp.org

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Ancient Persian Pharmaceutical Vessels and Tools in Iranian Archaeological Museums

Arman Zargaran,[1,3] Seyedeh Aida Ahmadi,[2] Saeid Daneshamouz[3] and Abdolali Mohagheghzadeh[3]

[1] Research Office for the History of Persian Medicine, Shiraz University of Medical Sciences, Shiraz, Iran;
[2] Student Research Committee, Shiraz University of Medical Sciences;
[3] Departments of Traditional Pharmacy and Pharmaceutics, Faculty of Pharmacy and Pharmaceutical Sciences Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Research in the history of science can document the development and changing roles of civilisations. Relics and remains from historical periods are important sources of evidence that help clarify history. Medical sciences, traceable since the beginning of history, are an important part of human knowledge.[1] Special tools and vessels were needed in medical practice, and archaeological findings such as surgical instruments from Greek and Roman times[2] or ancient India[3] are helping to fill some gaps in our knowledge of medical history.

The history of ancient Persia from prehistoric times to 637 AD goes back to about 10,000 years ago, and the development of pharmaceutical science and practice were particularly notable.[4] According to the Sassanid Pahlavic manuscript known as the *Bondahesh*, medicinal plants were one of the eleven plant groups.[5] The medicinal plant group used in ancient Persia comprised a number of subgroups, eg, antiseptics, analgesics, sedatives,[6] oils,[5] poisons,[7] antidotes,[8] abortifacients,[9] balms for ulcers,[10] and cosmetics.[4] Some ancient Persian medical words also went west and came into use in current medicine—for example, 'bezoar'. This word came from *pat-zahr*, the ancient Persian word meaning 'antidote'.[8] Unfortunately much written evidence was destroyed by invaders,[11, 12] and research on the ancient history of medicine and pharmacy in Persia thus remains limited.

Investigation into the history of pharmacy can help clarify the history of science, and archaeological findings are important sources of evidence that can shed light on ancient Persian pharmacy. We identified and analysed evidence provided by pharmaceutical vessels from ancient Persia held in major national museums, and present below descriptions of these materials and their putative uses in pharmacological and medical practice.

Methods

First, written evidence in the previous and recent literature on ancient Persia was reviewed and relevant data about pharmaceutical vessels was collected. Secondly, historical sites and museums in Iran were visited in the provinces of Fars, Tehran, Khuzestan, Hamadan, Kerman, Yazd, Isfahan and Gilan to photograph vessels and other artefacts of interest. Finally, the findings based on both sources were analysed and synthesised, and the results are presented here. This article is intended as an introduction to the various types of pharmaceutical vessels of interest; however, it is not our intention in this report to discuss the historical origins and evolution of the different vessels.

Results

For convenience, our detailed explanations of the different vessels are grouped below according to their purported function.

1. Mortars and pestles

The mortar and pestle is one of the most important pharmaceutical vessels, used extensively in the preparation of medicinal products. For example, *havanans* used a mortar and pestle to prepare the medicinal and ritualistic material known as *prahaoma* syrup.[13] This was made of *haoma* (*Ephedra distachya* L., a traditional Persian medicinal plant), pomegranate wood and milk (presumably cow's and sheep's milk).[14] *Haoma* has many medicinal properties and uses according to Zoroastrian religious belief.[9, 13]

Mortars can be divided into two groups: those without and those with a spout. The first were used to grind and mix solid substances and powders, whereas the second were probably used to mix fluids or semisolid substances. Mortars were made of different materials and in different sizes. More examples of the first group have survived than the second group. Figure 1 shows three different examples of the first group.

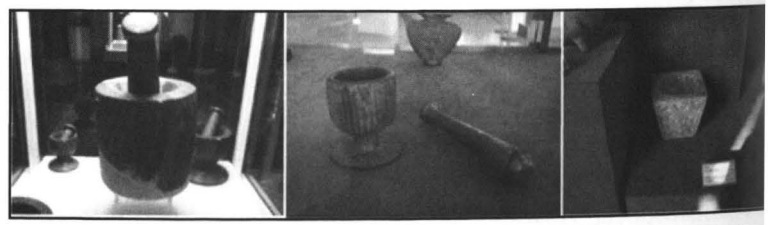

Figure 1. From left to right: Green stone mortar, Achaemenid period (550-330 BC), Persepolis Museum; Admiralty metal mortar, Achaemenid period, National Museum of Iran; and earthen mortar, Parthian period (247 BC -224 AD), National Museum of Iran.

An example of a mortar with a spout (second group) was reported earlier.[4] This stone mortar, dating back to the prehistoric period, was found in the Se-Pestanak-Emarlou site in Gilan province.

2. Strainers

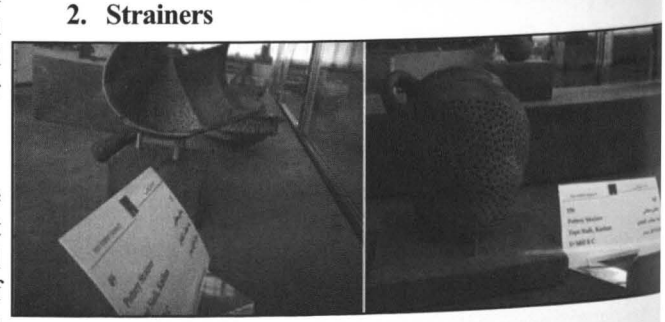

Figure 2. Strainers found in Sialk, first millennium BC, National Museum of Iran.

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Strainers were probably used to filter medicinal solutions and syrups, and also as sieves for solids. The *asnatar* was the person who filtered *prahaoma* syrup through sieves during the ritual preparation of the syrup.[1] Two examples of these strainers, found in the Sialk Hill site, are shown in Figure 2.

3. Distillation vessels

The invention of the distillation vessel called *ghaer-o-anbigh* (alembic) is credited, according to traditional belief, to the Persian scientist *Jābir-ibn-Hayyān* (Geber) (721-815 AD).[15] However, archaeological findings show these tools were used in ancient Persia (Figure 3). Distillers were probably used to make various types of aromatics, volatiles or alcohol-containing liquids used as antidotes,[16] haematopoietics,[5] and keeping the blood healthy[17] according to ancient Persians manuscripts. The upper part of a distiller found in the Klourez site in Gilan province is shown in Figure 3 (left). Steam entered the

Figure 3. Upper vessel from a distiller, first millennium BC, National Museum of Iran (left); lower vessel from a distiller, first millennium BC, Rasht Museum (right).

vessel through the hole shown in the mirror. The lower part of a distiller, found in the Mianroud site in Gilan province, is also shown in Figure 3 (right).

4. Teapots

This type of vessel provides heat and steam to obtain extracts from herbs and medicinal preparations. They have been used to make tea as a commonly-consumed beverage since the eighteenth century AD in Iran;[18] therefore they were probably used in ancient Persia for other purposes such as preparing medicines. Two examples of ancient teapots are shown in Figure 4.

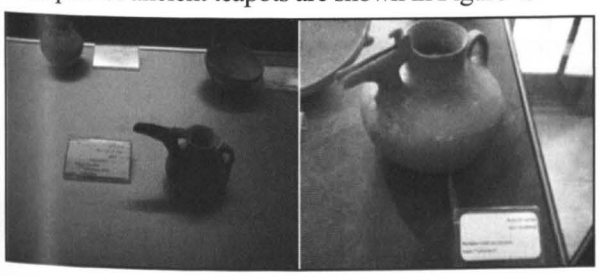

Figure 4. Earthen teapot, second millennium BC, Narenjestan Museum, Shiraz (left); Earthen teapot, second millennium BC, Pars Museum, Shiraz (right).

5. Hand stone mills

These mills were used in ancient Persia to crush plant material manually.[19] Some examples are shown in Figure 5.[20]

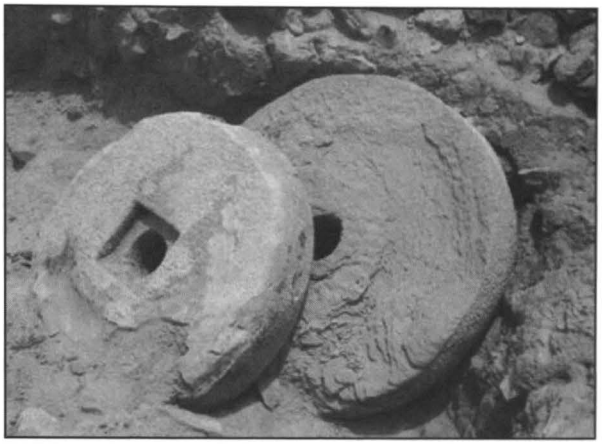

Figure 5. Ancient Persian millstones (about second century BC) from the ancient city of Asak.

6. Baby drinking cups

Spill-proof baby drinking cups, the forerunners of modern-day 'sippy cups', were known as *shirmak*. An example is shown in Figure 6.

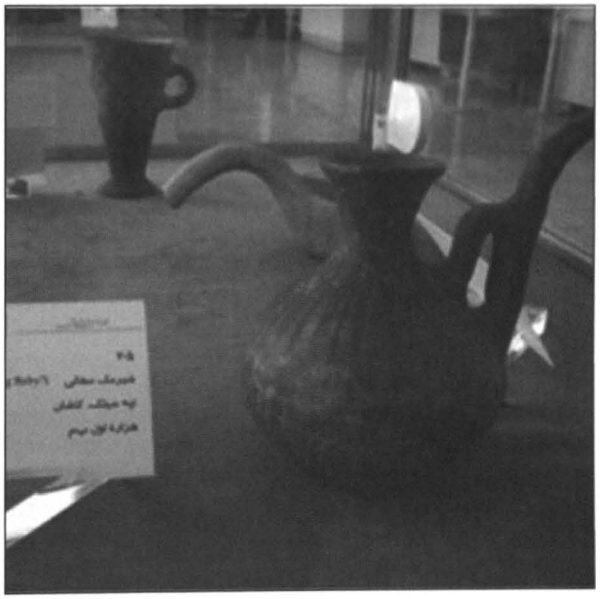

Figure 6. Earthen baby drinking cup, found in Kurdistan province, first millennium BC, National Museum of Iran.

7. Rhytons

These drinking vessels were used for beverages.[21] Various types of rhytons in different shapes (usually animal shapes) and made of different materials have been discovered. A rhyton from the Achaemenid period (found in Persepolis) incorporating the head of a bull (or cow) is shown in Figure 7 (left). A bird-shaped vessel found in the *Agh-oular* site in Gilan province is shown in Figure 7 (right).

8. Censers

Inhaling medicinal smoke, one of the most important methods of herbal drug administration, has been used by Persian people (*Peganum harmala* smoke, for example) throughout history to the present time.[22] Smoke was

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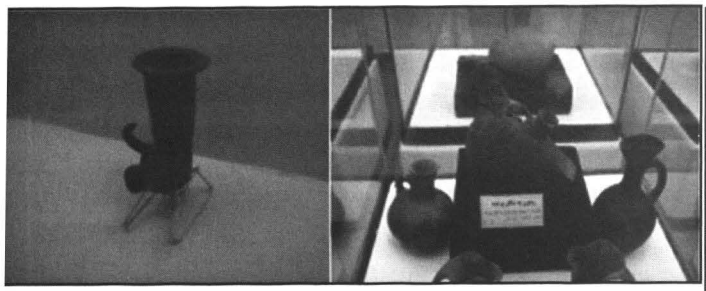

Figure 7. Rhyton, Achaemenid period, Persepolis Museum (left); earthen rhyton, first millennium BC, Rasht Museum (right).

produced in censers and used as an antiseptic or air purifier, as well as for inhalation.[22] Kundur (*Boswellia glabra* Roxb. ex Colebr.), rasan (*Inula helenium* L.), sandalwood (*Santalum album* L.), camphor (*Cinnamomum camphora* L.), pomegranate wood (*Punica granatum* L.) and *palang moshk* (an as yet unidentified species) are some common herbs and plants that were used to make medicinal smokes.[4,23]

In the stone relief of the Achaemenid emperor Darius the Great shown in Figure 8, two large censers are prominently featured.

9. The *jorghedan* (paediatric medicine dropper)

An interesting type of vessel used to give liquid medicines to babies has been in use since ancient Persian times, and remains in use in some isolated rural areas. An example of this medicine dropper from the Sassanid period is shown in Figure 9. Currently, such droppers are given various different names such as *makouk* or *jorghedan* in Fars province, or *koch* in Khozestan province.[24]

10. Miscellaneous vessels

Other examples of vessels which were used to prepare or store medicines are shown in Figure 10. The left panel shows a pharmaceutical vessel with five mouths and a single spout; the right panel shows a medicine storage

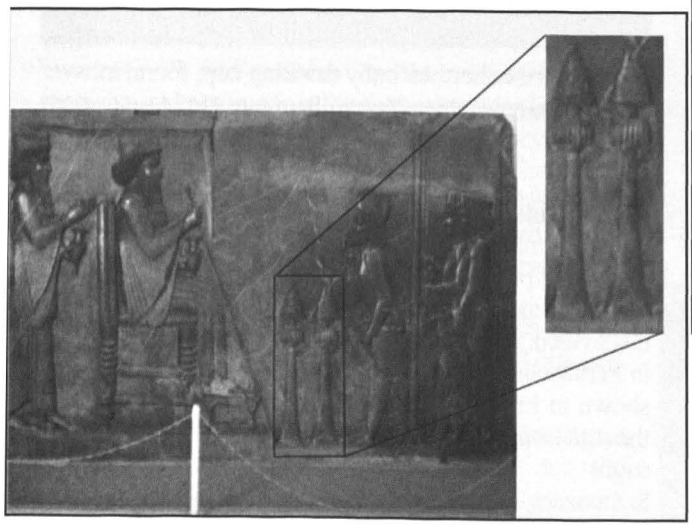

Figure 8. Two censers in use during an audience with Darius the Great, Achaemenid period, Persepolis.

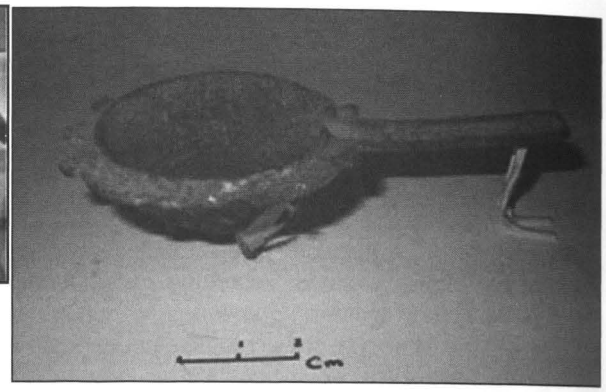

Figure 9. Gun metal *jorghedan* (paediatric medicine dropper), Sassanid period, Pharmacy Museum, Shiraz.

Figure 10. Pharmaceutical vessel found in Gilan province, first millennium BC, National Museum of Iran (left); drug storage vessel, Parthian period, Avicenna Museum, Hamadan (right).

Figure 11. Ancient Persians priests carrying medicinal vessels, Achaemenid period, Persepolis.

vessel. Palm wood vessels for medicines, called *tabangou* in the Parthian period,[25] have not survived to the present day.

Stone reliefs at Persepolis show ancient priests bearing different types of vessels (Figure 11). These vessels probably contained medicines such as *prahaoma* syrup.

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Conclusions

The illustrations provided here are a part of the body of unwritten evidence about the history of pharmacy in Iran. This evidence can help clarify the history of pharmacy in ancient Persia as a part of the global history of science. Pharmaceutical vessels and tools that have come down to us today illustrate developments and innovations in pharmacy from ancient times, and also document the knowledge accumulated in the Persian empire regarding the preparation and administration of different medicines. Most of the vessels described here, in fact, remain in use in current pharmaceutical science, including the mortar and pestle, strainer, censer and distiller. The spill-proof baby drinking cup (*shirmak*) was apparently invented in ancient Persia. The infant medicine dropper known as the *jorghedans* could, if appropriately redesigned, continue to serve its purpose in the present day.

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Authors' addresses: Arman Zargaran (PharmD, PhD candidate of Traditional Pharmacy); Research Office for the History of Persian Medicine, North Ghaani Street, Shiraz, Iran, Postal Code: 71397 48479, Email: zargarana@sums.ac.ir;

Seyedeh Aida Ahmadi (Medical Student), ahmadisai@sums.ac.ir;

Saeid Daneshamouz (PharmD, PhD - Assistant professor), daneshamuz@sums.ac.ir;

Abdolali Mohagheghzadeh (PharmD, PhD, PostDoc – Professor), mohaghegh@sums.ac.ir

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Medical supplies for the expeditions of the heroic age of Antarctic exploration: Oral medications

Dr H.R. Guly FRCP, FCEM

Retired consultant in emergency medicine, Derriford Hospital, Plymouth, PL6 8DH

This paper describes the drugs for oral use that were taken on Scott's and Shackleton's expeditions to the Antarctic. In particular, it discusses laxatives, opium, antidiarrhoeals and tonics. The majority of the drugs taken to the Antarctic on the expeditions of the heroic age were oral medications, including tablets and tinctures. This paper describes the drugs taken and discusses a few classes of drug. Previous papers in this series have described the various expeditions and the types of medical stores taken.[25]

Laxatives

When planning a drug formulary now, whether for an expedition or even for a hospital, while one must be able to cope with any eventuality, it is also important to reduce the number of different drugs. Thus one will stock two or three mild analgesics rather than every available mild pain killer. This is for reasons of cost, space, weight (on an expedition), stock control and safety (it is easier to be familiar with fewer drugs). This does not seem to have been considered in these expeditions. Thus on the *Terra Nova* expedition, at least 13 drugs were taken for assisting expedition members in opening their bowels and variously described as aperients, cathartics, laxatives and purgatives. This presumably reflects on the fact that constipation was thought to be the cause of much illness. Three are different preparations of cascara and three contain mercury. The laxatives taken were:[1,2]

Aloin compound
Blue pill (contained pure mercury)
Calomel (mercurous chloride)
Carlsbad salt
Cascara and gentian compound (cascara sagrada, nux vomica, belladonna, gentian, capsicum)
Cascara compound (cascara sagrada, euonymus, iridin, nux vomica, hyoscyamus)
Cascara sagrada
Colocynth & hyoscyamus
Confection of senna
Croton oil
Grey powder (metallic mercury and chalk)
Laxative vegetable
Rhubarb compound pill

Some of these were taken in large numbers. Cascara sagrada gr. 2 was taken in both the Burroughs Wellcome 251 and 254 medicine cases and an additional 5,000 tabloids were taken. The maximum dose of cascara sagrada was gr 8 and so this represents significantly more than 1,250 maximum doses. In addition, they took 12 boxes of glycerin suppositories

Some of these may have had more than one use – thus mercury was also used to treat syphilis.

Laxatives carried by other expeditions included
Alba mixture (magnesium sulphate and carbonate)
Blue pill and rhubarb
Epsom salts (magnesium sulphate)

Opium

Another example of apparent over-stocking is opium. The *Terra Nova* took 1,100 tabloids of opium gr. 1 and 1,100 tabloids of tincture of opium 10 minims in addition to opium in both the 251 and 254 medicine cases and the sledging cases. The dose of opium was gr. 1 or 2 and of tincture it was 10-15 mins, so they took more than 1283 maximum doses in tabloid form. In addition they also took 3 lb of opium tincture which is equivalent to more than 2,000 maximum doses. The original overwintering party was 33 men and, assuming that the party was equipped for three years, this is 32 maximum doses per man per year (excluding the opium in the medical cases and excluding opium in combination with another drug, eg in antidiarrhoea medication).

Antidiarrhoeals

Diarrhoea was a very common complaint both on the ships travelling south, when it was probably due to contaminated water, and in the Antarctic where all the recorded diarrhoea occurred in the field in sledging parties and when living rough, eg the *Terra Nova* Northern Party spending the winter in a snow-hole and the Swedish expedition after their shipwreck. This was often blamed on bacterial infection but may have been due to a very high fat and protein diet. On Shackleton's return from his 'Furthest South' Dr Eric Marshall recalled:

> First one, then another, went down with diarrhoea and cramps, until we were all totally incapacitated, for 24 hours on one occasion, and unable to travel. ... My diary noted that more than one member turned out eight or nine times that night.[3]

The unpleasantness and debilitating effect of diarrhoea on a sledging journey or while camping in the Antarctic can be imagined.

Table 1 shows the drugs taken that could be used for treating diarrhoea (though some had other indications.) The commonest preparation seems to have been lead and opium. On the *Terra Nova* Northern Party, Dr Murray Levick's diary says about Frank Browning

> I have got him on pil-plumbi c-opio [lead and opium] again, alternating this with pulo cret aromit c-opio [aromatic chalk and opium].[4]

On another occasion he treated the leader with bismuth and opium.[5]

Tonics and stimulants

Another category of drugs taken was tonics. Table 2 shows the tonics taken on the different expeditions.

Large quantities were taken. Table 3 shows the quantities of tonics taken additional to those as standard in the medical cases and sledging cases.

On the internet there are many references to Shackleton and Scott using cocaine eg:

> In 1909, Ernest Shackleton took 'Forced March' brand cocaine tablets to Antarctica, as did Captain Scott a year later.[6]

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Table 1. Antidiarrhoeals taken on the expeditions of Scott and Shackleton.

	Expedition	*Discovery*	*Nimrod*	*Terra Nova*	*ITAE*
Drug	**Notes**				
Aromatic chalk powder with opium	Chalk, opium gr 1/8 with aromatics	*	*	*	*
Astringent mixture	7 constituents				*
Bismuth subnitrate		*			
Blaud pill	Also called tabloid ferrugin. Contains ferrous carbonate	*			
Blaud pill & arsenic		*	*	*	
Chlorodyne	laudanum, tincture of cannabis, chloroform	*		*	*
Kino compound powder			*	*	*
Lead acetate & opium		*	*	*	*
Morphine sulphate		*	*	*	*
Opium		*	*	*	*
Opium tincture	Laudanum	*		*	

Table 2. Tonics and stimulants taken on different expeditions

Drug	Notes	*Discovery*	*Nimrod*	*Terra Nova*	ITAE
Kola compound	Also known as 'Forced March'. Kola and cocaine.		*	*	*
Liquid arsenicalis		*			
Nux vomica tincture	Contains strychnine	*		*	*
Tonic compound	Iron, quinine, strychnine	*	*	*	*
Eastons syrup	Iron phosphates, quinine, strychnine		*		*
Iron & arsenic compound	Iron, quinine, arsenic, strychnine, saccharine	*	*	*	*
Iron & quinine citrate	Contains quinine approx gr 1/3	*	*	*	
Iron perchloride tincture		*		*	
Caffeine compound	Caffeine, antipyrin				*
Caffeine citrate			*		

'Forced march' (also known as 'kola compound') was a combination of extracts of coca (active ingredient cocaine) and kola (active ingredient caffeine). This was certainly used on the *Nimrod* expedition and by members of the Ross Sea Party of the ITAE.[7] This is discussed under sledging drugs. in a later paper.

Easton syrup tabloids were also used on this expedition both by Shackleton on his attempt to reach the South Pole[8] and by the party that reached the South Magnetic Pole.[9]

The British expeditions were not alone in taking cocaine preparations. The most common way that coca was used was as a tonic wine[10] and the commonest preparation was Mariani wine which contained 6mg of cocaine per fluid ounce. This was a weak solution when compared to cocaine in tablet form which came in strengths of half, one and five grains (one grain is 68.4 mg) and toxicity does not seem to have been a problem with this.[11] Dr Jean-Baptiste Charcot records using this: 'I … take them [Bongrain and Boland] some cakes and some Mariani wine to warm them'[12] and gave a testimonial to the manufacturers: 'I am convinced that Mariani wine will contribute greatly to the success of the French Antarctic Expedition.'[13]

In addition to the drugs listed, alcohol, especially in the form of brandy, but also whisky and rum, was regarded as a stimulant drug. This too might be used in a similar way. Thus Dr. Archibald McLean on the Australian expedition (1911-14) relates how a party of three men missed a depot and had to travel 67 miles with minimal food:

> Fortunately, they had, as well, a small store of absolute alcohol, which was ordinarily used for lighting the primus stove. Without doubt, the stimulation of small quantities of the alcohol, taken from time to time, helped them in safety to the Hut.[14]

Another example of its use (also from the

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Table 3. Quantities of tonics taken on Terra Nova expedition additional to those in medicine chest and sledging cases

Drug	Quantity
Iron and arsenic compound	3000 tabloids
Iron perchoride tincture	24 oz (680 grams)
Nux vomica	2200 tabloids + 24 oz of tincture
Tonic compound	3000 tabloids

Australian expedition) occurred after they suffered carbon monoxide poisoning:

> For a long time we felt too weak to move … Then Close revived sufficiently to go outside, to reappear presently with the medicine chest. We carried a small supply of brandy for an emergency, and this bucked us up a bit, after which some caffeine tablets also did good work to quicken our pulses, which were very weak and slow.[15]

I have discussed the use of alcohol in more detail elsewhere.[16] The above are uses of a tonic as a stimulant but tonics were also used where a psychotropic drug might (justifiably or otherwise) be used today. Dr. Levick wrote of the leader of his party:

> We have had our first real return to 'polar ennui'… for two days the chap sulked and wouldn't speak, or would hardly speak when I spoke to him. He got worse and worse, and started to get into a sort of neurasthenic condition... I said … 'You've been looking rotten lately, and I'm going to give you a tonic, which will make you feel a new man... I have given him a tonic with strychnine in it, and he has been better & much more cheerful ever since.[17]

Cardiac disease

The word 'tonic' might have other meanings: the medical report of the Ross Sea Party, describing Richard Richards who had cardiac symptoms says:

> I placed him on a cardiac tonic and he laid up till Oct 10 … On 9th Oct He had a general tonic leaving off the cardiac tonic which was never renewed.[18]

I suspect that the 'cardiac tonic' was either digitalis, as Arnold Spencer Smith's diary from the same expedition describes digitalis as such, or strychnine whose indication was said to be 'heart failure'.[19]

On a number of expeditions, there were deaths due to cardiac disease. Dr Frederick Cook on the Belgian Expedition (1897-9) called this 'polar anaemia' and this was almost certainly beriberi due to thiamine deficiency.[20] Drug remedies were tried with little success. Cook wrote:

> Medicament, I find, is of little service. A temporary relief is sometimes effected by well-directed drugs, but the lasting effects are disappointing. Iron and arsenic, and many of the ordinary tonics effective in home anaemias, are entirely inert. After considerable experiment, I have abandoned drugs as an important aid… Laxatives are generally necessary, and vegetable bitters with mineral acids, are a decided help. Strychnine is the only remedy which has given me any service in regulating the heart, and this I have used as a routine.[21]

Charcot wrote of the same disease: 'I am relying more on absolute rest and the beneficial effects of milk, fish and nature, together with a little digitalis and caffeine.'[22]

On the first German expedition, a party of five (without a doctor) stayed on Kerguelen while the rest of the expedition sailed to Antarctica. Two developed beriberi and one died. They clearly thought this to be an avoidable death, writing:

> This affliction was the more terrible to us as the only medicine against the hereby induced heart affection, digitalis, was not available, which, as is well known, can only be prescribed by a physician.[23]

It is sad that they blamed themselves, as digitalis would probably not have saved the life. It is interesting that British groups without a doctor were allowed to use digitalis whereas the Germans were not, despite the botanist (Emil Werth) being a pharmacist. (He was the other sufferer of beriberi but survived and was admitted to hospital in Australia.)

The other drugs as supplied by BW&Co are listed in Table 4 (pp 75-77). However, I make the following points:

For simplicity, I have not stated the drug strength. Many of the drugs were produced in different doses. Thus calomel came in seven different strengths. Some expeditions took one drug in different sizes eg the *Discovery* took tincture of aconite tabloids in both one and five minim strength but for other drugs, one expedition might have taken drugs at one strength while another expedition might have taken the same drug with different sized tablets.

The indications that I have given are a brief summary. I have given the most likely reasons for giving a drug in the Antarctic at that time. For example quinine would not have been used as an antimalarial in the Antarctic. For a full list of indications, I would refer readers to a pharmacopoeia of the time or BW&Co's own literature.[24]

Chemicals were often used in different ways. Thus mercuric chloride could be taken by mouth in a dose of gr 1/100, intramuscularly in a dose of gr 1/50, as eye lotion with a tablet of gr 1/1000 dissolved in 5 minims of water or as an antiseptic with higher doses dissolved in water. At times it was difficult to know exactly how each drug was used in practice.

Medicines have more than one name. Thus aspirin, xaxa and acetylsalicylic acid are the same drug. When medicines are described in various documents, Latin and English names are often used almost interchangeably, together with abbreviations. Thus rhubarb compound powder is the same as Glycyrrhizae compound powder, Pulvis Glycyrrhizae Compositus or Pulv. Glycyrrh. Co. There were also popular names: the Board of Trade list of drugs for ships without doctors, describes how the drug bottles should be labeled. Thus Senna Compound Mixture was to be labeled 'Black Draught'.

The drugs listed for the *Discovery* expedition exclude the drugs in the 251 or 254 medicine cases. I have noted

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Table 4. Other oral drugs taken on expeditions

Drug	Notes	Indication	*Discovery*	*Nimrod*	*Terra Nova*	IT AE
Aconite tincture		Neuralgia, catarrh, other febrile conditions	*			
Ammoniated quinine				*	*	*
Ammonium acetate			*			
Ammonium bromide		Sedative	*	*	*	*
Ammonium carbonate		Stimulant, expectorant, emetic	*	*	*	*
Antifebrin	Acetanilidide	headache, neuralgia, rheumatism, catarrh, tonsillitis	*			*
Antipyrin	Phenazone	Antipyretic, analgesic, especially for headache	*	*	*	*
Aspirin	Xaxa & Empirin were brand names	Rheumatism, pain killer, antipyretic		*	*	*
Belladonna tincture	Action is that of atropine	antispasmodic, asthma, catarrh, used with narcotics	*		*	*
Bismuth & soda	Bismuth subnitrate gr 2½, sod bicarb gr 2½	"acts powerfully in gastric catarrh following the abuse of alcohol"	*	*	*	*
Bismuth, pepsin & charcoal			*		*	
Black pepper confection			*			
Calcium lactate		Given in various conditions to increase blood coagulability. Also use for scurvy				
Camphor compound tincture		Mild expectorant, gastric stimulant, "sexual and general sedative"	*		*	
Capsicum tincture		"stimulant of mucous membranes", used in anoexia, flatulance, spasm	*		*	*
Chloral hydrate		Hypnotic	*	*	*	
Chloralamide		Hypnotic & sedative	*		*	*
Chloretone	chlorobutanol	mild sedative				+
Chlorodyne	laudanum, tincture of cannabis, chloroform	Diarrhoea, flatulence, cough, sedative	*		*	*
Cinchona compound tinct.		Tonic, antipyretic	*			
Citric acid		scurvy, rheumatism, catarrhal jaundice	*	*	*	*
Cocaine hydrochoride		Gastric pain, sea sickness, tonic	*			*
Cod liver oil			*		*	
Coffee mint	Sodium bicarbonate with small quantities of others	Flatulence, nausea		*		*
Digitalis tincture		Heart disease	*	*	*	*
Dover powder	Opium gr 1/40, ipecacuanha gr 1/40		*		*	*
Ergotin	Ergot extract	Headache	*			
Gelsemium tincture		neuralgia, retention of urine	*	*	*	*
Gentian and soda compound	Sodium bicarbonate, gentian & ammonium carbonate	Bitter tonic and stomach medicine		*	*	*
Gingament	Sodium bicarbonate with small quantities of others	Dyspepsia, nausea, heartburn, flatulence				*
Ginger essence		Aromatic stimulant	*	*	*	*
Grey powder & Dover powder	Mercury, opium gr 1/20, ipecacuanha		*		*	
Hyoscyamus tincture	From Henbane. Action similar to atropine	Nerve sedative, adjunct to purgatives	*	*	*	*

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Table 4. Other oral drugs taken on expeditions (*continued*)

Drug	Notes	Indication	*Discovery*	*Nimrod*	*Terra Nova*	IT AE
Ipecacuanha		Expectorant, gastric and hepatic stimulant, amoebic dysentery	*	*	*	
Ipecacuanha sine emetine	Ipecacuanha deprived of its emetic principles		*	*	*	
Ipecacuanha with squill	Ipecacuanha, opium, squill, ammonia		*		*	*
Lead and quinine citrate				*		
Lime juice		Scurvy prophylaxis and treatment	*			
Liquorice powder compound			*	*	*	*
Male fern capsules		Tapeworm	*		*	*
Menthol compound		Dyspepsia			*	*
Morphine sulphate		Analgesic, cough, diarrhoea, hypnotic	*	*	*	*
Paregoric	Camphorated tincture of opium			*	*	*
Pepana	Contains pepsin and pancreatin. Peptonic seems to be a brand name	To aid digestion	*	*	*	*
Pepsin		To aid digestion	*		*	
Pepsin bismuth and charcoal				*	*	
Phenacetin Co		Analgesic used for neuralgia, rheumatism, influenza	*	*	*	*
Potassium bromide		Sedative and hypnotic, epilepsy	*		*	*
Potassium iodide		Expectorant. Also for syphilis, rheumatism	*	*	*	*
Pyramidon	Aminopyrine	Antipyretic				*
Quinine belladonna and camphor		Catarrh		*	*	*
Quinine bisuphate		Malaria, fever, tonic	*	*	*	*
Salicin	Related to aspirin	Antipyretic and for rheumatism	*		*	
Salol	Phenyl salicylate	Intestinal antiseptic, rheumatism, cystitis	*	*	*	*
Santonin		Antihelminthic	*	*	*	*
Soda-mint	Sodium bicarbonate, ammonium bicarbonate, menthol oil	Antacid, flatulence	*	*	*	
Sodium bicarbonate powder		Antacid, flatulence				*
Sodium salicylate		Rheumatism	*		*	*
Strong iron perchloride with glycerine			*		*	
Sulphonal		Hypnotic	*	*	*	
Tannin	Tannic acid	Astringent. Can be used topically	*	*	*	
Terebinthinae oil	Turpentine oil	Topical counter-irritant, antiseptic. Internal purgative, antihelminthic				*
Thirst quencher	Tartaric acid & sodium bicarbonate			*	*	

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Table 4. Other oral drugs taken on expeditions (*continued*)

Drug	Notes	Indication	*Discovery*	*Nimrod*	*Terra Nova*	ITAE
Thyroid gland		many			*	
Tonic compound	Iron, quinine, strychnine	Iron-containing tonic	*	*	*	*
Trinitrin	Glyceryl trinitrate	Hypertension, angina, heart disease, asthma	*		*	
Trilactine	Bacterial preparation used to sour milk	Gastric problems			*	
Trional	Similar to sulphonal	Sedative				*
Validol	methyl valerianate and menthol	Sea sickness				**

** = for Dr Macklin's private use

elsewhere that this expedition also took Palatinoid drugs[25] but I do not know what drugs were taken in this form. The list for the *Nimrod* expedition is incomplete.

Acknowledgments

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Author's address: The Shrubbery, Bedford Rd, Horrabridge, Yelverton, Devon, PL20 7QH; hguly@aol.com

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Mozart and the Court Plaister: Music, illness and the Mozarts' stay in England 1764–5

Susan Kirby

Recently Keeper of the Museum Collections, Royal Pharmaceutical Society, London

On a recent visit to the Mozarteum (the Mozart Birthplace Museum) in Salzburg my eye was caught by an envelope for a plaister displayed in the 'Daily Life on the Road' exhibition. It is labelled *The Genuine Court Plaister, London* (Figure 1). The handwritten inscription in German on the envelope translates as 'Wolfgang Amadé Mozart has brought this from England'. The envelope comes from Mozart's estate and is dated to the second half of the 18th century. It is stamped with the date 1881, the year when the International Mozarteum Foundation was established. Unfortunately the envelope is empty and the plaister itself has not survived. The museum has no further information.

Wound dressings and beauty spots

This envelope would have contained a plaster which could be cut up to supply individual wound dressings as required. Modern plaster materials and adhesives are waterproof and are highly efficient at covering wounds and staying in place. In the past plasters were made of silk covered with isinglass (pure gelatine derived from fish or animal hooves) or india rubber. They came in various colours, black or flesh-coloured pink or white, and might incorporate arnica to help heal bruises. Superior types were made from gold-beaters skin (animal membranes used to separate sheets of gold leaf). In the Royal Pharmaceutical Society (RPS) Museum collection there are at least eleven examples and also a mid- to late-Victorian advertisement for Glover's Celebrated India Rubber Court Plaster prepared and sold by George Glover & Co Chemists, 19 Goodge Street, Tottenham Court Road, London W.

Figure 1. Mozart's Court Plaister
© Internationale Stiftung Mozarteum

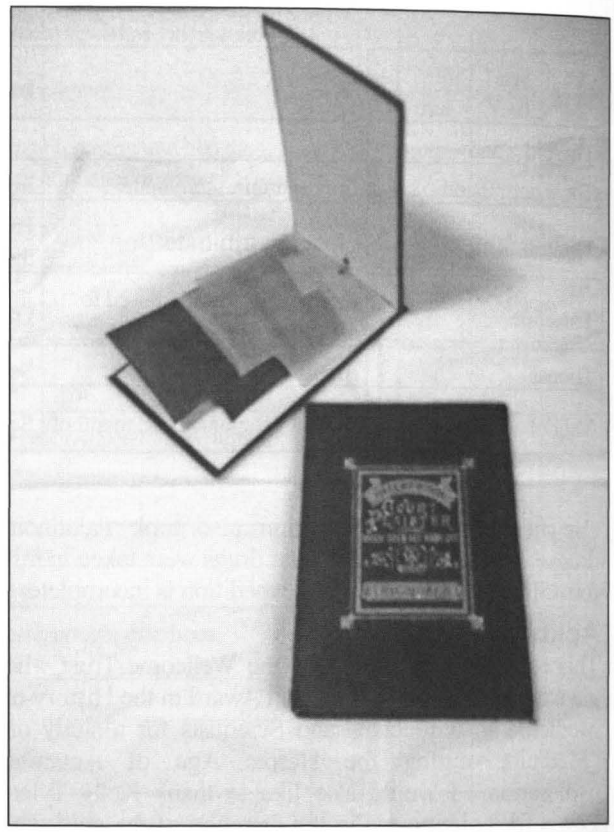

Figure 2. Case and Court Plasters.
Museum of the Royal Pharmaceutical Society

The plasters were made from expensive materials because, unlike a medicated plaster which was generally worn on an area covered by clothing, court plasters were used to cover blemishes or small cuts and abrasions on visible areas such as the hands. They were supplied in what the advertisement calls 'handsome cases' and a similar receptacle is in the RPS Museum collection (Figure 2).

They became known as court plasters, as in addition to being used as wound dressings, courtiers adopted them to make artificial beauty spots or patches, a fashion that begun in the mid 16th century and lasted until the late 18th century. These were not necessarily simple round or square shapes. They could be supplied as stars, crescents or even shaped like a coach and horses. The idea was to draw attention to the most beautiful feature, the eyes, nose or cheek for example. The exact position on the face was supposed to communicate a particular emotion or mood. The lovely painting by François Boucher, *Une dame à sa toilette,* shows a woman concentrating hard no doubt to create the right effect as she applies a 'mouche', the

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French for beauty spot. They could also be used on the décolletage. The New Brunswick based company, Johnson & Johnson supplied boxes of 'One Hundred Assorted Beauty Spots' until the 1914-1818 war. In the 20th century some film stars adopted artificial beauty spots and, with the current enthusiasm for all things vintage, there are now web-based discussions on the best ways to make your own.

Medicinal plasters

Two plasters of a different sort are on display at the RPS Museum. Plasters (or plaisters) could also be used for the delivery of a medicinal preparation through the skin. They allowed prolonged contact of an ointment or cream with the skin.

Medicinal ingredients were mixed with resin, wool fat or beeswax to make a semi-solid preparation that was heated gently, usually in a dish over a water bath, to make it spreadable. At the same time a plaster iron was warmed over a flame. A shape for the plaster was selected and a stencil cut in stiff paper. The size could vary but standard sizes were recommended. The pharmacist would then stretch a piece of leather, white sheepskin or chamois over a flat board. The stencil was wetted and applied to the material so it adhered to it. The melted medicinal mass was then poured into the centre of the stencil and spread evenly over the material. The stencil was pulled off just before the plaster had set and the material trimmed to give a border of about 1 cm.

The finished plasters were packed in a flat box separated by sheets of oiled or grease-proof paper. The label advised patients to warm the plaster gently if it was not adhesive enough.

Plaisters were used for delivery of a number of different medicaments: for example belladonna for stopping the secretion of milk, cantharides (blistering fluid) as a counter-irritant, mercury for swollen joints or glands and resin for supporting joints and fixing splints. Pitch plaisters gained notoriety as they were used to suffocate victims who might end up on the anatomists' slab prior to the 1832 Anatomy Act. Mustard plaisters, a paste of mustard and cornflour applied to the chest, were still being used as late as the 1950s. The theory was that body heat activated ingredients that loosened mucus and unclogged your nose. The last to be regularly made up in the local pharmacy were belladonna for back pain and ear plaisters for reducing mastoids. A modern equivalent is the use of nicotine patches to help smokers quit cigarettes and, for women, patches to deliver hormone replacement therapy to help alleviate symptoms during the menopause.

Adhesive strapping

A new type of adhesive tape has been developed in the 21st century by Japanese inventor Dr Kenzo Kase. Kinesio strapping, a hypoallergenic, skin-weight, stretchy adhesive tape first widely seen in the UK as blue strips on athletes' bodies during the Tour de France and the Olympics in 2012, does not deliver any drug transcutaneously. Its efficacy has yet to be proven but it is claimed to support injured joints and muscles and to relieve pain by lifting the skin and improving blood flow.[1]

The Mozarts in London

The envelope on display at the Mozarteum is for a plaister of the first type. We will never know whether it was used to cover a cut or deployed for cosmetic purposes. It was purchased sometime between 23rd April 1764 and 30th July 1765 when the Mozart family was in England. Leopold Mozart, a violinist at the court of the Archbishop of Salzburg, brought his two gifted children to London. The trip was part of a tour of European courts as Leopold realised that as child prodigies, they could earn more than him. They were away for more than three years. Wherever they appeared they caused a sensation and brought in money although their income dropped as their novelty value wore off.

Their baptismal names were Joannes Chrysostomus Wolfgangus Theophilus and Maria Anna Walburga Ignatia. His son is more commonly known as Wolfgang

Figure 3. Mozart as a boy of six, two years before his visit to England. Wellcome Library, London

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Amadeus Mozart (1756-1791), nicknamed 'Wolferl' or 'Wolfgangerl', and his daughter was known as 'Nannerl'.

We do know that the young Mozart was made aware of the importance of appearance in the courts of Europe and appreciated fine clothes from an early age. Nannerl was thirteen when the family left England and perhaps already old enough for a beauty spot although patches were worn by both men and women at this time.

The two children were quite frequently ill during their travels. It may be that Wolfgang's peripatetic childhood weakened his health and compromised his immune system, contributing to his early death. Leopold enjoyed good health apart from the common respiratory problems of the day. His last years were affected by rheumatism and possibly gout. He was a great believer in patent medicines and carried a supply when travelling – tonics, powders, laxatives and ointments.[2] In accordance with the medical practice of the time, he advocated bleeding on Saint's days and purging on others.

After a financially rewarding five months in Paris, Leopold decided to go to London. They were all violently seasick during the Channel crossing in a privately hired boat. Wolfgang had numerous respiratory illnesses and sore throats. He was unable to play at a benefit concert on 20th May because of illness, possibly a recurrence of tonsillitis that he and his sister had experienced in Paris that laid him low for 120 days. By the 29th June he was well enough to play at a concert for the benefit of the Lying-In Hospital, Surrey. This was at the Rotunda of Ranelagh Gardens on the Thames at Chelsea. The boy was hailed as a prodigy and genius.

Leopold became ill on the evening of Sunday 8th July 1764 whilst attending a concert at Sackville Tufton, Earl Thanet's house in Grosvenor Square. Peter J Davies describes what happened:

> Leopold suffered with fever and chills, and he began sweating profusely. He buttoned up his cloth coat over his silk waistcoat and was carried home in a hired sedan-chair. For six days he attempted to cure himself by taking his favourite household remedies, but when the fever persisted he consulted a physician. Leopold was diagnosed as having a severe inflammation of the throat. He was treated with enemas, laxatives and venesections (blood-letting), methods of treatment that were at that time invoked to drive out fever. By 3rd August his fever had indeed subsided, but after such drastic shock therapy it is little wonder that he felt weak and exhausted.[3]

The physician was concerned that this 'cold' might develop into consumption. In her reminiscences of 1792, Nannerl called this his dangerous throat ailment. Modern diagnoses of this illness do include the early stages of pulmonary tuberculosis but it might have been glandular fever, diphtheria or even scarlet fever. So that Leopold could convalesce, the whole family moved into the house of Dr Randal in Five Fields Row, now 180 Ebury Street, in what was then the garden village of Chelsea.[4] They stayed in Chelsea for seven weeks by which time Leopold had fully recovered.

During their stay at Chelsea, the children were ordered to keep very quiet and were not allowed to play the clavier. However, during this period, Wolfgang composed his symphonies in E flat (K16)* and in D (K19). The strong influence of JC Bach is evident. Some commentators see Leopold's illness as having the benefit of allowing his son to develop his own style for the very first time.[5] Nannerl had to copy out the music as she sat at her brother's side. On one occasion he said to her, "Remind me to give the horn something worthwhile to do!"[6]

It is not possible to find out whether Leopold kept medicinal plasters as one of his household remedies. However, there is a reference to something similar later on in their lives. In September 1781, when Leopold Mozart was troubled with dizziness, Wolfgang recommended two remedies that were then fashionable in Vienna:

> ...get some cart grease, wrap it in a bit of paper and wear it on your chest. Take the bone of a leg of veal and wrap it up in paper with a kreuzer's worth of leopard's bane and carry it in your pocket. I am sure that this will cure you.[7]

Commentators see this illness of Leopold's as highly influential in that it allowed the young Amadeus to compose on his own. For the first time he was able to explore his own ideas and develop his own style as his father was indisposed and unable to directly influence his son.

The lawyer, magistrate and writer, Daines Barrington, visited the Mozarts in June 1765. Some years later, on 15th February 1770, he gave his evaluation of Mozart's genius in a paper given to the Royal Society in London.[8] He confirmed the boy's incredible gifts with regard to sight-reading, composition, modulation and extemporary composition. He was astounded by Wolfgang's harpsicord playing as the boy's small hands were hardly able to reach a fifth. He also observed some normal childish behaviour when Wolfgang was distracted from playing the clavier by a cat. He would also run around the room with a stick between his legs as a hobby-horse.

The Mozarts performed at Buckingham House, renamed Queen's House, three times during their stay in London. This house had been purchased by King George III as a family home on the edge of town and was much smaller than the later Buckingham Palace. At the time St James's Palace was the official and ceremonial royal residence for King George III and Queen Charlotte. The young king spoke to Wolfgang after a concert and when out in his carriage the next morning, actually waving 'before the whole world' to the boy who was out walking with his family. Leopold wrote that 'the graciousness with which their Majesties received us cannot be described ... their easy manner and friendly ways made us forget that they were the King and Queen of England.'[9]

Leopold published Mozart's *Six Sonatas for Harpsichord and Violin* at this time, dedicating them to Queen Caroline. On 19th July 1765 the manuscript of *God is Our Refuge* (K 20) was presented to the British

* K indicates the Köchel number of WA Mozart's compositions.

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Museum together with the three engraved volumes of Sonatas (K6-15) and the Paris group portrait by Delafosse after Carmontelle.[10]

After a fifteen month stay, the Mozarts left London on 24th July 1765. They attended the Canterbury horse races and reached Calais on 1st August after a 3½ hour crossing. Leopold had special prayers offered for a smooth passage; on this occasion there was no seasickness and they were able to enjoy their lunch at Calais.

The success of the stay was mixed despite the enthusiasm of the Royal family. As one modern commentator has observed,

> Wolfgang arrived in London as a charming eight-year old prodigy and drew admirers from every part of the city. He left as a less cute nine-year old performing keyboard tricks in pubs to sceptical audiences.[11]

The family suffered various bouts of ill health that were very worrying at the time and served to undermine their future health. The best medical practitioners and most carefully prepared medicines could do very little to alleviate them. However, it was a trip that allowed Wolfgang to compose on his own and to start developing an individual musical language for the very first time.

Sue Kirby MA, AMA was Keeper of the Museum Collections at the Royal Pharmaceutical Society from September 2010 to June 2012.

Author's address: Flat 3, 21 Rosslyn Hill, London NW3 5UJ; skirby@scudamore.demon.co.uk

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Petrus Hispanus (circa 1215-1277) and 'The Treasury of the Poor'

Renzo Console and Christopher J. Duffin
Woking and Sutton, Surrey

The medical Pope

The identity of Petrus Hispanus is a matter of some controversy. Part of the problem is centred on the fact that 'Hispanus' covers the general region of the Iberian Peninsula, referred to in medieval times as 'las Españas' (the Spains), incorporating both present day Spain and Portugal.[1] It is eminently conceivable that more than one Peter from this area was active at the same time. The interpretation that the name Petrus Hispanus referred to a single scholar has recently been challenged with the suggestion that three contemporary individuals might fall under this titular umbrella, one becoming Pope, a second (Petrus Hispanus Portugalensis) writing about the soul, and the third (Petrus Hispanus medicus) being primarily a physician.[2]

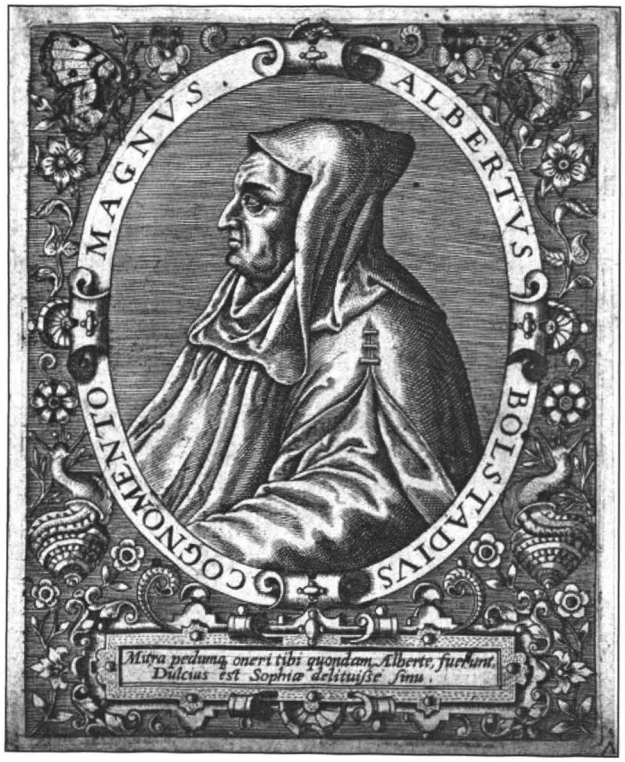

Figure 1. Portrait of Albertus Magnus (Count Albert Bollstaedt, died 1280), Petrus Hispanus's teacher at Paris. Line engraving by T. de Bry, 1597.
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The traditional stance is that Pedro Julião was born in Lisbon sometime between 1210 and 1215.[3] Following his early education at the cathedral school in Lisbon, he went on to study at the University of Paris. Here, he attended the lectures of Albertus Magnus (1193 or 1202-1280; Fig. 1) the German Dominican Friar. Following a distinguished teaching career at Cologne, Regensburg, Freiburg, Strasbourg and Hildesheim, Magnus arrived in Paris in 1245. Here, he completed his doctorate and taught as an influential master of theology on dialectics and logic and on Aristotelian physics and metaphysics. In addition to Petrus Hispanus, who studied medicine and completed his degree in 1247, Magnus counted Thomas Aquinas (1225-1274), the Italian Dominican priest, among his students. From Paris, Petrus Hispanus moved to the University of Siena (Tuscany, Italy), where he took up the post of Professor of Medicine. While at Siena he also began to make a collection of medical prescriptions. Increasingly famous as a university teacher, he returned to Lisbon and then moved to Guimarães in the Braga District of northern Portugal, where he was successively the councillor and spokesman for King Afonso III of Portugal (1210-1279), and then Prior of Guimarães. Defeated in his attempt to become Bishop of Lisbon, he became Master of the School of Lisbon.

Appointed Physician in Ordinary to Tedaldo Visconti (c. 1210 - 1276; reigned as Pope Gregory X from 1271), Petrus was elected Archbishop of Braga (1273) but was appointed to be Cardinal-Bishop of Frascati near Rome before he could take up the position. Pope Gregory X was succeeded by two Popes, Innocent V and Adrian V, whose reigns were very short indeed, each lasting only a few months. Petrus fared little better, being elected Pope John XXI (Fig. 2) on 13th September 1276, but dying on 14th May 1277. Having added an apartment to the papal palace at Viterbo so that he could work unimpeded, among other things, on his medical interests, he died from injuries sustained when the ceiling collapsed onto him.

Figure 2. Portrait of Petrus Hispanus, Pope Juan XXI (circa 1215-1277).
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Bartholomew of Lucca, the Italian Dominican priest and medieval historian (also known as Tolomeo da Lucca or Ptolemy da Lucca; c. 1236-c. 1327) suggested that his death happened whilst Petrus 'was engaged in a fit of complacent and self-admiring laughter' following some verbal denunciations of fellow monks.[4] It was later suggested that his death was an Act of God on account of his being a magician.[5] As Pope John XXI, Petrus was commemorated on two Portuguese stamps issued in 1977 (Fig. 3), and a 5 euro coin in 2005 (supposedly to mark the 800th anniversary of his birth). The International Federation of Catholic Doctors (FIAMC) has endowed the João XXI Prize, an International Prize for Medical Ethics and Deontology, in honour of the only physician to become a Pope.

Figure 3. Portuguese stamps issued in 1977, commemorating the 700th anniversary of Petrus Hispanus's death.

Medical works

Petrus Hispanus is credited with having written around 14 medical works, a number of which are brought together in a recent translation, largely into Portuguese.[6] His treatise on 'The Diseases of the eye' (*De Morbis Oculorum*), known from about six manuscripts, is acclaimed as an important early work on ophthalmology.[7] His *Tractatus de Febribus* is regarded as an important medieval work about fevers. The *Summa de Conservanda Sanitate* (Summa concerning the preservation of health) is concerned with maintaining health, and lists the beneficial and deleterious items which affect the various organs of the body, working from head to toe.

Isaac Israeli ben Solomon (c. 832-c. 932) wrote the *Dietae Universales* and *Dietae Particulares* which were translated from Arabic into Latin by Constantine the African (1017-1087), a Tunisian physician who later became Professor of Medicine at Salerno and then entered the Benedictine order late in the 11th century. Petrus's commentary on the work raises over 1000 questions which he then proceeds to discuss.

Further works ascribed to him include the *Regimen Sanitatis* (Rule of Health) and *Regimen Salutis per Omnes Menses* (Rule of Safety through All the Months), a treatise on anatomy, and commentaries on various medical works of other authors. His treatise on the soul, *Scientia Libri de Anima,* contains a chapter entitled *De Motu Cordis,* which has been praised as the best available representation of the medieval understanding of cardiovascular physiology.[8]

Thesaurus Pauperum

Petrus probably wrote his *Thesaurus Pauperum* during his time as Physician to Gregory X in the early part of the 1270s. The work is known from at least 23 extant manuscripts dating from the 13th through to the 15th century.[9] The title of his treatise is telling, and places it as an important volume in a whole genre of medical works aimed at the poor, or budding physicians who could not afford expensive texts. The literary progenitor of this genre seems to be Asaph Harofe or Asaf Judaeus, the Jewish physician, believed to have resided in the Middle East during the 6th century.[10] One of the sections in his *Book of Medicine* is dedicated to the treatment of the poor and is introduced by the words:

> This is the beginning of the remedies for the poor so that they may be cured for free, for all these remedies can be found everywhere at any moment, and Asaf beseeched his students to treat the poor with these remedies for free with loving kindness and magnanimity.

A series of medieval Arabic treatises contain similar emphases, a notable example being the *Tibb alfuqara wa'l-masakin* (Medicine for the Poor and Destitute) by Ibn al-Jazzar (Ahmed Ben Jaafar Ben Brahim Ibn Al Jazzar Al-Qayrawani; ca. 895-ca. 979). Like Petrus's *Thesaurus Pauperum*, this treatise gives a list of medicinal recipes working in a sequence from head to toe, in this case beginning with headaches and closing with podagra.[11] The *Compendium Medicinae* (Compendium of Medicine), probably written between 1230 and 1250 by Gilbertus Anglicus (c. 1180-c. 1250) follows the same pattern. Petrus Hispanus justifies this format in most manuscripts with his final sentence of the Preface:

> Therefore in the name of Jesus Christ, the supreme physician, who heals at His will all our infirmities, since He is the head of the faithful, let us begin with diseases of the head and descend to the feet.[12]

The popularity of Petrus Hispanus's *Thesaurus Pauperum* is obvious from the number of translations that were produced into the major European languages. Also, like a number of 12th and 13th century western texts, it was rendered into Hebrew on at least three occasions, the most famous being the *Ozar ha-dallim*, a translation prepared in 1394 by Todros Moses Bondoa Yom-Tob, a French physician who seemingly flourished in Cavaillon (Provence-Alpes-Côte d'Azur region of southeastern France) under the name Todros of Cavaillon.[13]

Juan XXI did not claim to be the inventor of the majority of the medicines that he was describing in his book. In fact he wrote this very long sentence giving due recognition to the predecessors and contemporaries from whom he culled many of his recipes:[14]

> The statements of the physicians, whose remedies are all in this work, should be intended as if we were reading the originals, because everything that I have been able to find in the books of the ancient physicians, professors and modern experimenters has been faithfully collected, diligently investigating their paths with tireless and expensive work, placing here their own words or the meaning in other terms

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more easily understandable by the doctors, so that, if had the books available, we would not find differences from what is written here.

However, he also attributed a good number of medicines to himself.

As has been mentioned above, the diseases and their remedies are described by Juan XXI in an orderly fashion (Fig. 4).[15] He first deals with various problems affecting the head and its organs, both of a physical or psychiatric nature. Then he deals with the chest, abdomen, liver, spleen and kidneys. Sexual problems are then considered, for men and for women separately. The book ends with the diseases of the limbs.

For each remedy Juan XXI specifically mentions the name of the original author whose books he has consulted. The time of his writing followed the great period of rediscovery of the texts of ancient authors. An invigorating impetus to western scholarship took place in the 11th and 12th centuries with the 'era of translators'; scholars such as Gerard of Cremona (c. 1114-1187) and Constantinus Africanus (1017-1087) rendered Greek texts and those in

Figure 4. First page of a 1497 edition of *Thesaurus pauperum*, published in Florence. Two physicians are treating patients, illustrating Petrus Hispanus's writing technique of working from the head to the extremities.
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other languages, often via Arabic, into Latin, and thereby brought them to the attention of Italian and Spanish scholars in particular. Thus, the earliest authors mentioned by Juan XXI belong to Roman and Greek antiquity, such as Pliny (23-79AD), Galen (129-c. 200) and Dioscorides (c. 40-90).

A second group of authors to whom he referred had not lived very long before Juan himself; indeed some were virtually his contemporaries. This probably accounts for his

Figure 5. Title page of the 1518 edition of Petrus Hispanus's *Thesaurus pauperum*, published by G. de Rusconi, Venice.
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free access to their manuscripts. These authors include Albertus Magnus (1193 or 1206-1280), Avicenna (c. 980-1037), Bartolomaeus Anglicus (died 1272), Gilbertus Anglicus (c. 1180-c. 1250), Odo de Meung (the *Macer Floridus*, 11th century), Nicolaus Salernitanus (12th century), Matthaeus Platearius (died c. 1161) and Trotula (early 12th century), all still well known today in the history of medicine and pharmacy. Thus, Juan XXI drew upon all of the major pharmaceutical authorities during the compilation of his medicinal recipes.

Petrus Hispanus's book of prescriptions intended for the poor was printed many times between 1494[16] and 1784, in Latin (Fig. 5), Italian, English, French and – most frequently – Spanish, under the titles of *Thesaurus Pauperum*, *Tesoro de Poveri*, *The Treasury of Health*, *Le Trésor des Pouvres* and *Libro de Medicina Llamado Tesoro de los Pobres* respectively (Fig. 6). Three sixteenth century printed editions were consulted for this study: *Thesaurus Pauperum* (Lyons, 1525), *Libro de Medicina Llamado Tesoro de los Pobres* (Seville, 1540) and *Thesaurus Pauperum* again (Frankfurt, 1578). In the first one 'Joannes XXI pontifex maximus cui Petro Hyspano ante nomen erat'[i.e. '… who was formerly

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called Petrus Hyspanus'] is indicated as the author; in the second the author is simply presented as 'Papa Juan'; and in the third the author is 'Petrus Hispanus Pontifex Romanus'.

The medicines described in those editions are usually rather simple, because the stated purpose of Petrus Hispanus's book was to enable the poor to prepare their own medicines without the expensive involvement of a physician. In a recent Italian book reproducing and translating a rare 13th-14th century manuscript of Hispanus's volume,[17] the author of the Introduction states that the most frequent ingredients of those medicines were wine, vinegar, common oil, honey, egg, pork, rue, oil of roses, hare, goat, deer and salt, which in those days were also the most common food ingredients.

Figure 6. Title page of *Tesoro de los Pobres* (Seville, 1535), showing two physicians within a decorative border.

Following this suggestion, it has been possible to search the entire manuscript for those substances mentioned above and to list the conditions for which they were believed to be effective. That list is as follows:

Wine dandruff, frenzy, phlegm, headache, epilepsy, occlusion of the urinary organs, breast cancer, occlusion of the womb.

Vinegar scabies, lethargy, frenzy, headache, earache, diphtheria, haemorrhoids, occlusion of the spleen, breast cancer, occlusion of the womb, female sterility, childbirth problems, sciatica, gout, hernia, anthrax.

Common oil scabies, headache, earache, nosebleed, pleurisy, parasitic worms, occlusion of the urinary organs, itching of the penis, amenorrhea, childbirth problems, arthritis, sciatica, gout.

Honey dandruff, frenzy, headache, epilepsy, scotoma, diphtheria, parasitic worms, dropsy, occlusion of the urinary organs, amenorrhea, breast cancer, occlusion of the womb, childbirth problems, gout, arthritis, sciatica, hernia.

Egg dandruff, frenzy, headache, eye pain, nosebleed, paralysis of the tongue, diarrhoea, haemorrhoids, dropsy, occlusion of the urinary organs, excessive lactation, childbirth problems, gout, anthrax.

Pork dandruff, scabies, lethargy, frenzy, earache, convulsions, diphtheria, diseases of the chest, pleurisy, arthritis, gout.

Rue phlegm, headache, epilepsy, convulsions, scotoma, eye pain, toothache, nosebleed, paralysis of the tongue, diseases of the chest, nausea, haemorrhoids, occlusion of the womb, arthritis, gout, anthrax.

Oil of roses frenzy, headache, haemorrhoids, itching of the penis, female sterility, gout, anthrax.

Hare frenzy, epilepsy, convulsions, eye pain, nosebleed, diarrhoea, occlusion of the urinary organs, haemorrhoids, excessive lactation, women's sterility, sciatica, hernia.

Goat dandruff, lethargy, diarrhoea, haemorrhoids, obstruction of the liver, dropsy, occlusion of the spleen, occlusion of the urinary organs, itching of the penis, excessive menstruation, breast cancer, undesirable pregnancy, sciatica, arthritis, hernia.

Deer lethargy, headache, epilepsy, convulsions, toothache, syncope, parasitic worms, haemorrhoids, occlusion of the spleen, female sterility, gout, sciatica.

Salt scabies, phlegm, haemorrhoids.

Of course, these substances were almost never used in isolation; rather, they were combined with a number of other substances, including other aliments, to be administered together in mixtures, so that their combined virtues could act both in concert and synergistically.

Despite the deliberate simplicity of the majority of the compositions described in Petrus Hispanus's *Thesaurus Pauperum*, it is also possible to find a small number of medicines containing gold in some printed editions of that book; and it seems unlikely that the poor could have afforded them, unless the apothecaries or the merchants selling gold were charitable and gave it away for free.

For example, in the Latin 1525 edition of *Thesaurus Pauperum*[18] gold is recommended in three medicines to treat a type of syncope caused by lack of blood in the vessels of the brain. Among the printed editions which have been examined in the course of this study, this one of 1525 is the closest to the medieval manuscript mentioned above.

Similarly, the Spanish 1540 edition of *Libro de Medicina Llamado Tesoro de los Pobres*[19] contains three

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preparations with gold 'to heal those who have a weakened heart'.

Another version of *Thesaurus Pauperum*, published in 1578, contains additional references to medicines where an ingredient is gold. In the chapter 'about the diseases of the eyes' a medicine is recommended as effective[20] for all diseases of the eyes, leprosy, all blemishes of the body and the preservation of youth. A chapter 'about syncope' describes an 'electuary for every type of syncope' that is similar to one found in the 1525 edition seen above.[21] A little further on in the same chapter is a list of substances, including gold, which 'purify and alter the heat of the spirits and of the blood of the heart.' And finally 'Diamargariton and Galen's Laetificans, with the addition of pure gold and silver, comfort the heart marvellously.'

Later impact of *The Treasury of the Poor*

Following an appreciable number of sixteenth century editions of Petrus Hispanus's *The Treasury of the Poor*, numerous references were made to the work in later medical publications. However, the characteristics of the work were intentionally different from those of later medical or pharmaceutical treatises. The ingredients, as mentioned above, were mainly alimentary substances easily and cheaply available to those who would benefit from them; few sophisticated simples are included. This means that Petrus Hispanus's preparations were not generally suitable for extended comment in later scientific treatises.

However, Petrus Hispanus's book is mentioned or quoted in later historical works, like a 1789 Latin edition of a book by Christian Gottfried Gruner on venereal diseases entitled *Aphrodisiacus sive de Lue Venerea*.[22] Among the quotations from many authors, given in chronological order from the time of Moses [!], there are some recipes cited in Petrus Hispanus's book, but originally derived from earlier authors: one for haemorrhoids (from Galen), three for ulcers of the penis (from Macer, Constantinus and Dioscorides), two for the swelling of the penis (both from Constantinus) and two for the hardening and abscess of the womb (both from Dioscorides).

An English translation of *Thesaurus Pauperum* was produced by Humphrey Lhuyd (Humfre Lloyd; 1527-1568), supposedly in 1552.[23] Following an MA at Oxford, Lhuyd went on to study medicine, becoming physician to Henry Fitzalan (19th Earl of Arundel; 1512-1580). He later returned to Wales, serving as Member of Parliament for Denbigh (1563-1568), and is famous for his history of Wales and his pioneering cartographic work. Lhuyd's *The Treasury of Health* went through at least four further editions (1553, 1560, 1570, 1585), and one copy in Newberry Library is even suggested as being published in 1550.[24] Lhuyd 'improved' the volume for his readership by adding 'the causes and signes of the sicknesses and diseases' and a number of remarks gathered from a range of other, largely medieval, authors.

Shortly after the publication of Lloyd's translation, and probably as a direct consequence of it, a number of vernacular English medical works cited individual receipts with due acknowledgement to Petrus Hispanus. Timothie Bright (1551-1615), for example, is one author who incorporated items from Petrus Hispanus's work into his own. Going up to Trinity College, Cambridge, at age 11, after graduation in 1568 he studied in Paris and then worked as physician in St Bartholomew's Hospital, London (1586-1590) before entering the church. Rather more famous for his *Hygieina* (1581), *Therapeutica* (1583) and *A Treatise of Melancholie* (1586), he is also believed to be the author of *A Collection of Medicines growing for the most part within our English Climat* (1615).[25] In the latter volume, he notes the use of 'Galengal' (Ginger) and 'water of the decoction of Pilosella' (European Hawkweed, *Pilosella officinarum*) for the treatment of jaundice, 'Betony with Mulsa and pepper' to expel bladder and kidney stones; 'three spoonefuls of the iuice of Horehound, and so much of hony' and 'Five leaued grasse drunk with wine for the space of thirtie daies' were commended for curing epilepsy.[26] Five-leaved grass, also known as *Quinquefolium*, could refer to Ginseng (*Panax quinquefolius*) or native *Potentilla reptans*.

John Banister (c. 1540-c. 1610), an Elizabethan barber-surgeon, physician and seaman, was also a prolific and influential writer of medical treatises.[27] He commends a number of Petrus Hispanus's recipes for a variety of cankers, fistulas and types of scab, including 'succus herbae sanctae mariae' (the juice of Ageratum) mixed in red wine and drunk daily from the beginning of March to the end of August to 'wast Scrophules and kernellie knots'.

Thomas Lupton (flourished 1572-1584) was a somewhat controversial figure. His *A Thousand Notable Things* was first published in 1579 and includes, in addition to many quotations from Mizaldus (Antonio Mizauld,1510-1578, the French astronomer and physician), a number of references from *Thesaurus Pauperum*. His choice of receipts emphasises the use of readily available materials, as a few examples will illustrate:

> Grind Mustard with Vinegar and rub it well and hard on the Palms of the Hands or the Soles of the Feet, and it will help and quicken forgetful persons; take a Frog and cut her through the middle of the back with a knife, and take out the liver, and fold it in a Colewart leaf, and burn it in a new earthen pot well closed and give the ashes thereof unto him or her that hath the Falling Sickness to drink with Wine [...]. This was told me for a sure experiment and was also affirmed by Petrus Hispanus.[28]

A quiet legacy

Although not having a specifically stated objective of benefiting the poor, and perhaps not even being aware of the *Thesaurus Pauperum*, a number of later authors wrote medical books for a lay audience with simple explanations of the preparation of unsophisticated medicines. Remarkably, some women are included amongst these authors. At this time women were generally actively excluded from medical and

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pharmaceutical professions. Instead, unless their social standing gave them wider opportunities, they usually took on the roles of midwives, village healers and advisors on matters of domestic medicine.

One of those exceptional ladies was Caterina Sforza (1463-1509), an Italian aristocrat who was heavily involved in politics and is admired for her valiant leadership in defending her dominions against the Borgias. In the midst of a busy and action-packed life she found time to write the *Experimenti* containing a collection of 512 recipes of medicines and cosmetics. Another lady author was Isabella Cortese who flourished in the mid-1500s. An Italian like Caterina, little is known about her life. In 1561 she published a very successful book called the *Secreti*. Essentially an alchemy text, it also focuses on both medicinal and cosmetic recipes.

A good number of 'charitable' pharmaceutical books were written and published in the 17th century, especially in France. Although not referring to or mimicking the *Thesaurus Pauperum* directly (pharmaceutical chemistry having evolved considerably in the meantime), their nature and purpose is essentially the same. These volumes include *Le Médecin Charitable* (Philibert Guybert, 1639), *La Chymie Charitable & Facile, en Faveur des Dames* (Marie Meurdrac, 1666), *Toutes les Oeuvres Charitables* (Philibert Guybert, 1669), *L'Apothiquaire Charitable* (Jacob Girard des Bergeries, 1673), *Recueil de Receptes Où Est Expliquée la Manière de Guerir Toute Sorte de Maux* (Anonymous [Marie Fouquet], 1679), *Le Médecin François Charitable* (Jacob Constant de Rebecque, 1683), *Recueil de Remèdes Faciles et Domestiques* (Marie Fouquet, 1684) and *Les Remèdes Charitable de Madame Fouquet* (Marie Fouquet, 1685).

Two of these authors (Marie Meurdrac, 1610-1680, and Marie de Maupeou Fouquet, 1590-1681) were women who lacked any formal medical, chemical or pharmaceutical training. Some of these works were published in more than one version. Interestingly, *Le Médecin François Charitable* is almost identical in its structure to Petrus Hispanus's *Tractatus de Febribus* and *Thesaurus Pauperum* combined together, dealing with the same diseases in the same sequence. This is unlikely to be purely coincidental.

Conclusions

The life and career of Petrus Hispanus, the physician who became Pope Juan XXI just before his death by tragic accident, are unique: a formal and lengthy medical education was combined with simultaneous and inexorable progress through the hierarchy of the Christian Church via the offices of bishop and cardinal, leading eventually to papal status.

Amongst the various medical treatises which he produced, his charitable book *Thesaurus Pauperum* is still appreciated today as one of the earliest works of its kind. Its stated purpose was to benefit the poor, helping them to take care of their own health without the expensive involvement of physicians. As the *Thesaurus Pauperum* was written in Latin and only available in manuscript form, it is inconceivable that the poor would have had direct access to it. This raises the question as to how the author intended to achieve his objective. Perhaps, as a very authoritative and highly influential member of the Church, he was expecting that priests, who knew both Latin and could speak the contemporary local languages, would be able and willing to convey the useful content of his book to the poor as part of their pastoral duties.

Authors' addresses: Renzo Console, Tillington, Ridgway Road, Pyrford, Woking, Surrey, GU22 8PR, England; r.console@btinternet.com
Dr Christopher J. Duffin, Scientific Associate, Department of Palaeontology, The Natural History Museum, Cromwell Road, London, SW7 5BD, UK *and* 146, Church Hill Road, Sutton, Surrey, SM3 8NF, England; cduffin@blueyonder.co.uk

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